No. 95-____

Supreme Court, U.S.
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Supreme Court of the United States

OCTOBER TERM, 1995

SHOWA ALUMINUM CORPORATION and SHOWA ALUMINUM CORPORATION OF AMERICA,

—and—

MITSUBISHI MOTORS CORPORATION and MITSUBISHI MOTOR SALES OF AMERICA,

—and—

MITSUBISHI HEAVY INDUSTRIES, LTD. and MITSUBISHI HEAVY INDUSTRIES AMERICA, INC.,

Petitioners,

—v.—

MODINE MANUFACTURING COMPANY,

—and—

UNITED STATES INTERNATIONAL TRADE COMMISSION,

Respondents.

ON PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

PETITION FOR A WRIT OF CERTIORARI AND APPENDIX VOLUME I

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March 25, 1996

10 9 18

QUESTION PRESENTED

Whether patent infringement exists whenever the accused product or process is "equivalent" to the invention claimed in the patent, in that the differences are not "substantial" as determined by a trier of fact, even though the accused product or process is outside the literal scope of the patent claim, and even if equitable considerations provide no reason for expanding the patent's coverage beyond the literal scope of the claims.

LIST OF PARTIES AND RULE 29.1 STATEMENT

All Petitioners herein were Intervenors before the United States Court of Appeals for the Federal Circuit.

The Appellant before the Court of Appeals was Modine Manufacturing Company, one of the Respondents herein. The Appellee in that proceeding was the United States International Trade Commission, also a Respondent herein.

In the proceedings before the United States International Trade Commission, Respondent herein Modine Manufacturing Company was the Complainant and the Petitioners herein were the Respondents.

Pursuant to Rule 29.1 of the Rules of this Court:

1. Petitioner Showa Aluminum Corporation states that it is the parent company of its wholly-owned subsidiary, Showa Aluminum Corporation of America;

2. Petitioner Mitsubishi Motors Corporation states that it is the parent company of its wholly-owned subsidiary Mitsubishi Motors Sales of America;

3. Petitioner Mitsubishi Heavy Industries, Ltd. states that it is the parent company of its wholly-owned subsidiary Mitsubishi Heavy Industries America, Inc.

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OCTOBER TERM, 1995

No. 95-____

SHOWA ALUMINUM CORPORATION AND
SHOWA ALUMINUM CORPORATION OF AMERICA,

and

MITSUBISHI MOTORS CORPORATION AND
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MITSUBISHI HEAVY INDUSTRIES, LTD. AND
MITSUBISHI HEAVY INDUSTRIES AMERICA, INC.

Petitioners,

– v. –

MODINE MANUFACTURING COMPANY,

and

UNITED STATES INTERNATIONAL TRADE COMMISSION,

Respondents.

PETITION FOR A WRIT OF CERTIORARI TO THE
UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

PETITION FOR A WRIT OF CERTIORARI

Petitioners Showa Aluminum Corporation ("Showa"), Showa Aluminum Corporation of America ("Showa America"), Mitsubishi Motors Corporation, Mitsubishi Motor Sales of America, Mitsubishi Heavy Industries, Ltd. and Mitsubishi Heavy Industries America, Ltd., respectfully request that this Court grant a writ of certiorari to review the judgment of the United States Court of Appeals for the Federal Circuit, entered on February 5, 1996, reversing in part a final determination in favor of Petitioners by the United States International Trade Commission ("ITC").

This appeal presents precisely the same issue of patent law that sharply divided the *en banc* Federal Circuit Court in *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 62 F.3d 1512 (Fed. Cir. 1995) (*en banc*), and as to which this Court issued a writ of certiorari on February 26, 1996 (No. 95-728). In *Hilton Davis*, the Court of Appeals declared by a vote of 7-5 that a product found not to fall within the literal scope of a patent's claims must nevertheless be found infringing if it is "equivalent" to the invention of the claim -- that is, if the trier of fact has found that the differences in the accused product that take it outside the literal scope of the patent claims are "insubstantial." The Court in *Hilton Davis* divided sharply on the issue of whether patent infringement under the "doctrine of equivalents" may be found based solely on a finding that the differences between the accused and claimed devices are not "substantial," or whether liability for infringement also requires a finding of some special equitable circumstance that warrants allowing the patent holder a range of patent protection extending beyond the literal limits of the patent's claims. The petition for certiorari that this Court granted was directed to precisely that disputed issue.

The identical issue is presented in this appeal. The ITC, in finding that Petitioners had not imported any products that infringed the patents in issue, declined to extend the patent claims at issue beyond their literal limits to embrace asserted "equivalents." The ITC specifically found that that equity provided no reason for doing so, since the patent holder had known about the structure now asserted to be equivalent but had made a conscious strategic decision not to claim it during the patent prosecution, and since Showa, which had independently developed the accused products without knowledge of the patented invention, could not fairly

be accused of having unscrupulously copied the patent while making insignificant changes to avoid literal infringement. The Court of Appeals reversed this holding, and remanded for application of the doctrine of equivalents, on the express basis that its prior ruling in *Hilton Davis* invalidated the ITC's consideration of equitable factors. Since the predicate of the Court of Appeals' decision has been placed in question by this Court's grant of certiorari, and since the present case presents a particularly strong factual basis for denying "equivalents" beyond the patent's literal claims, certiorari should be granted here as well.

OPINIONS BELOW

The opinion of the Court of Appeals (App'x Vol. I, 1a-28a) is reported at 75 F.3d 1545. The final determination of the ITC (App'x Vol. I, 29a-31a), and the initial determination by Chief ALJ Janet Saxon which the final determination adopted in part (portions material to the issues raised in this petition, App'x Vol. I, 32a-86a), are not reported.

JURISDICTION

The Court of Appeals entered judgment on February 5, 1996. The jurisdiction of this Court is invoked under 28 U.S.C. § 1254(1).

STATUTORY PROVISIONS INVOLVED

35 U.S.C § 111 provides in pertinent part:

Application for patent shall be made, or authorized to be made, by the inventor, except as otherwise provided in

this title, in writing to the Commissioner. Such application shall include (1) a specification as prescribed by section 112 of this title . . . .

35 U.S.C § 112 provides in pertinent part:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

35 U.S.C § 271 provides in pertinent part:

(a) Except as otherwise provided in this title, whoever without authority makes, uses, or sells any patented invention, within the United States during the term of the patent therefor, infringes the patent.

STATEMENT OF THE CASE

The Patent in Dispute

This appeal arises out of an investigation initiated by the ITC pursuant to Section 337 of the Tariff Act, 19 U.S.C. § 1337, at the behest of Modine Manufacturing Company ("Modine"), into whether Showa and certain of its customers

had unlawfully imported into the United States condensers for automobile air conditioning systems that infringed Modine's U.S. patent no. 4,988,580 (the "'580 patent")[1] (App'x Vol. II) Modine's patent is directed to a condenser in which two hollow pipes known as "headers" are joined by a row of parallel hollow tubes, through which refrigerant flows as it condenses from a vapor to a liquid. As is indicated by the patent's title, "Condenser with Small Hydraulic Diameter Flow Paths", a central assertedly novel feature of the patent is the small size (measured by reference to "hydraulic diameter") of the flow paths in the condenser's tubes. Modine asserted in its patent that by departing from the prior convention of passing the refrigerant through a single snaking "serpentine" tube, and instead using a group of shorter parallel tubes between hollow headers so that the refrigerant could pass through several tubes at once, it had been able to use tubes with very small flow paths, thereby enhancing the amount of heat transfer.

When Modine first began prosecuting a patent for its asserted invention, it stated throughout its patent specification and in its claims that the patent application was directed to a condenser with tube flow paths having a hydraulic diameter of "about 0.015 to about 0.070 inches." After Modine's efforts to obtain a patent claiming this range were unsuccessful, it abandoned its initial application and filed a succession of new applications, in each of which it replaced every reference to "0.070 inches" in the patent specification and claims with a reference to "0.040 inches." Modine

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1. Section 337 proscribes unfair acts in the importation of articles into the United States. Such unfair acts include the "importation into the United States . . . of articles that – infringe a valid and enforceable United States patent." 19 U.S.C. § 1337 (a)(1)(B)(i).

admitted, and the ITC and the Court of Appeals found, that Modine had made this change to avoid a rejection of its claims by the Patent and Trademark Office based on a prior art condenser, the "Cat condenser", that featured parallel tubes between headers and other elements common to Modine's asserted invention and had a hydraulic diameter of 0.04822 inch. (App'x Vol. I, 13a-14a, 42a-43a, 72a)

The '580 patent that ultimately issued to Modine contained several claims that recited an element of flow path hydraulic diameters "in the range of about 0.015 to about 0.040 inches," and two claims, numbered 9 and 10, that recited the non-numerical element of "relatively small hydraulic diameter". (App'x Vol. II, cols. 10-12) Modine asserted in the ITC action that Showa's accused condensers, which undisputedly had hydraulic diameters larger than 0.040 inch, infringed claims 9 and 10 because "relatively small" referred to a broader range of hydraulic diameters than the numerical range of the patent's other claims.[2]

---

2. Claim 9 in its entirety reads as follows:

> 9. a condenser for a refrigerant in a cooling system comprising:
>
> a pair of spaced, generally parallel, elongated cylindrical tubes defining headers;
> a vapor inlet in one of said tubes;
> said header tubes each having a series of elongated generally parallel slots with the slots in the series on one header tube aligned with and facing the slots in the series on the other header tube;
> a tube row defined by a plurality of straight, [sic] tubes of flat cross-section and with flat side walls and having opposed ends extending in parallel between said header tubes, the ends of said flat cross section tubes being disposed in corresponding aligned ones of said slots and in fluid
>
> (continued...)

The Proceedings Below

After a hearing held in February 1993, the ITC's Chief Administrative Law Judge issued an initial determination on April 23, 1993 concluding, among other things, that Showa had not infringed Modine's patent. The ALJ began by holding, based on Modine's statements in the patent specification and its actions and representations to the patent examiner in prosecuting the patent, that the element of "relatively small hydraulic diameter" in claims 9 and 10 should be literally interpreted as no broader than the

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2. (...continued)

> communication with the interiors of said header tubes, at least some of said tubes being in hydraulic parallel with each other;
>
> web means within said flat cross-section tubes and extending between and joined to the flat side walls at spaced intervals to (a) define a plurality of discrete, hydraulically parallel flow paths within each flat cross-section tube that extend between said header tubes; to (b) absorb forces resulting from internal pressure within said condenser and tending to expand the flat cross-section tubes; and to (c) conduct heat between both said flat sides and fluid in said flow paths, *said flow paths being of relatively small hydraulic diameter* which is defined as the cross-sectional area of the corresponding flow path multiplied by four (4) and divided by the wetted perimeter of the corresponding flow path;
>
> serpentine fins incapable of supporting said flat cross-section tubes against substantial internal pressure extending between facing flat side walls of adjacent flat cross-section tubes;
>
> each of said flow paths including at least one elongated crevice extending generally along the length of the associated flow path.

Claim 10 in its entirety reads as follows:

> 10. The condenser of claim 9 wherein each flow path has a plurality of said crevices.

numerical range of 0.015 to 0.040 inch. The ALJ then concluded that Modine should not be allowed any range of "equivalent" hydraulic diameters beyond the literal range of its claims, for three reasons: (i) there was no special equitable reason to permit Modine any range of equivalents above .040 inch since Showa's condensers with larger hydraulic diameters were not "unanticipated equivalents," hydraulic diameter having been a central subject of the patent prosecution, and since Showa could not be characterized as an "unscrupulous copyist" in light of its independent development of the accused condensers (App'x Vol. I, 71a-72a); (ii) the accused condensers were not equivalent because they did not perform substantially the same function in substantially the same way to achieve substantially the same results as the condensers of the invention (App'x Vol. I, 80a-84a); and (iii) Modine was barred under the doctrine of prosecution history estoppel from embracing a hydraulic diameter range larger than 0.040 inch because it had surrendered that range in prosecuting the patent to avoid a rejection based on the prior art. (App'x Vol. I, 72a-80a)

The ITC adopted these aspects of the ALJ's decision as its own decision and concluded that the investigation of Showa should consequently be terminated on July 23, 1993. (App'x Vol. I, 29a-31a)[3]

The Court of Appeals for the Federal Circuit partly affirmed and partly reversed these components of the ITC's decision. (App'x Vol. I, 28a) With respect to the literal interpretation of claims 9 and 10, the Court agreed that "relatively small" did not cover a literal hydraulic diameter

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3. The ITC also made findings respecting the patent's validity that are not in issue in this appeal.

range beyond that of Modine's numerical claims, but remanded for further consideration of whether "*about* 0.040 inches", the words of the numerical claims, might embrace a broader literal hydraulic diameter limit than the precise 0.040 inch upper limit that the ITC had applied. (App'x Vol. I, 18a-19a)

With respect to the doctrine of equivalents, the Court rejected as unsupported by substantial evidence the ITC's findings that the accused products did not perform substantially the same function in substantially the same way to achieve substantially the same result as the invention of claims 9 and 10. (App'x Vol. I, 21a) In announcing this view, the Court noted specifically that the expected inferior performance associated with larger hydraulic diameters (as Modine had emphasized, for example, in the patent's performance graphs showing sharply deteriorating performance as hydraulic diameters became larger) did not prevent a finding of equivalence for hydraulic diameters larger than the literal upper limit of the claims. The Court also modified the ITC's finding of prosecution history estoppel, agreeing that as a result of positions Modine had taken during the patent prosecution Modine's "available range of equivalency is limited, by estoppel, to the hydraulic diameter of the Cat condenser," but rejecting the ITC's holding that Modine was estopped from asserting any equivalents above 0.040 inch. (App'x Vol. I, 22a-23a)

The question whether equitable considerations could be a component of the decision whether to apply equivalents, a question that the Court of Appeals had resolved in the *Hilton Davis* holding announced more than a year after Modine's appeal from the ITC's decision was briefed and argued, thus became dispositive as to whether Modine could obtain

coverage for hydraulic diameters between the literal upper limit of "about 0.040 inch" and some other "equivalent" limit short of the Cat condenser's 0.04822 inch hydraulic diameter range foreclosed by prosecution history estoppel. The Court of Appeals, relying explicitly on its decision in *Hilton Davis*, reversed the ITC on this score and remanded for the application of the doctrine of equivalents. The Court stated that the ITC's consideration of equitable factors relating to Modine's and Showa's conduct in denying Modine equivalents was "based on an incorrect view of the law," because "[a]s was explained in *Hilton Davis*, . . . there is no equitable threshold for determination of the factual question of infringement by equivalency." (App'x Vol. I, 20a-21a)

The Court of Appeals noted, without making any findings, that Modine had presented contentions and the ITC had "discussed" that according to Modine's approach to measurement (which Showa has disputed and the ITC never approved), one of several exemplar Showa condensers from a particular model of Mazda automobile had an average hydraulic diameter at selected test points falling within Modine's asserted range of equivalents. (App'x Vol. I, 19a-20a) On remand, Modine would be expected to argue that these measurements support a finding of infringement of the '580 patent under the doctrine of equivalents and consequent violation of the import laws, justifying import relief against Showa.[4]

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4. Although Modine might also make arguments on remand about the expanded scope of coverage above 0.040 inch to which the claims are entitled because of the word "about," Modine has never previously contended that a claim of "about 0.040 inch" would embrace the accused Showa condensers, and there is no basis in the record for so asserting. No matter what the precise literal upper limit of the claimed

(continued...)

REASONS FOR GRANTING THE WRIT

I.
THIS APPEAL PRESENTS AN IMPORTANT QUESTION OF PATENT LAW THAT THIS COURT HAS ALREADY DEEMED WORTHY OF REVIEW BY GRANTING CERTIORARI IN *HILTON DAVIS*

This appeal presents the identical issue that this Court has agreed to consider in *Hilton Davis*. In that case, the Federal Circuit Court of Appeals determined that there is no "equitable threshold for application of the doctrine of equivalents," that "the doctrine of equivalents has no equitable or subjective component," and that application of the doctrine instead involves solely an "objective assessment of the substantiality of the differences between the claimed and accused products or processes." (62 F.3d at 1523) The dissent, by contrast, citing considerable Federal Circuit precedent, spoke of "the uniquely equitable nature of the doctrine of equivalents" *id.* at 1542, and of the doctrine's being properly applied only in "those special cases in which the competitor's product is literally different but the difference is so insubstantial as to constitute a 'fraud on the patent', [such that] a court in the exercise of its *extraordinary equity power* may extend the remedy of infringement in order to protect the rights of the patentee granted by law." *Id.* at 1540 (emphasis added) (Plager, J., dissenting). *See also id.* at 1547-48 (Lourie, J. dissenting) (agreeing that the doctrine of equivalents is an equitable doctrine to be applied only in

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4. (...continued)
hydraulic diameter is found to be, moreover, Modine has asserted that the doctrine of equivalents will entitle it to something more, and the existence of that entitlement is directly placed in question by this Court's grant of certiorari in *Hilton Davis*.

the presence of special circumstances such as unscrupulous copying by the accused infringer or the inventor's inadvertent omission in not including within the claims language an unanticipated equivalent that was plainly intended to be part of the invention and is substantially indistinguishable from the invention literally claimed). The majority holding in *Hilton Davis* was an explicit basis for the Court of Appeals' reversal of the ITC's finding of no equivalents in this case -- not because the Court disagreed with the ITC's conclusions from its equitable analysis, but because the Court considered the exercise of any equitable analysis improper and irrelevant as a matter of law.

In *Hilton Davis*, the patentee amended its claims during the patent prosecution to recite that the invention operated at "a pH from approximately 6.0 to 9.0," specifically to avoid a rejection based on a prior art reference that operated at pHs above 9.0. The accused infringer's process operated at a pH of 5.0, well *below* the lower limit of the claimed range. Relying on the testimony of one of the inventors of the patented invention, the Court of Appeals found that there was substantial evidence to support a finding that a pH of 5.0 "had the same effect" as a pH of 6.0, and that the patented and accused processes were therefore equivalent. In so finding, the Court of Appeals did not ask why the patentee had not claimed in its patent the full range of pHs it later asserted to be equivalent. The Court rejected as irrelevant the accused infringer's assertion that equity did not support application of the doctrine of equivalents, and declined to place responsibility on the patentee, as the author of the patent claims, to specify the precise metes and bounds of its invention.

The present case even more starkly exemplifies the incongruous and unjust results that can flow from applying the doctrine of equivalents as articulated by the Court of Appeals in *Hilton Davis*. Here, the hydraulic diameter element in dispute was presented as a critical component of Modine's invention and was the subject of extensive interchange between Modine and the patent examiner during the prosecution of Modine's patent. Modine made the conscious decision, after initially having claimed hydraulic diameters up to about 0.070 inch, to narrow both its claims and the description of its invention in the patent specification to hydraulic diameters from about 0.015 to about 0.040 inch, in order to avoid the prior art Cat condenser with a hydraulic diameter of 0.04822 inch. Modine then repeatedly stressed this limitation of the upper end of its claimed hydraulic diameter range to the patent examiner, arguing that by so narrowing the scope of its invention, it had distinguished its invention over the prior art. (App'x Vol. I, 13a-14a, 41a-42a) By contrast to the pH of the accused process in *Hilton Davis*, which fell on the opposite side of the claimed range from the pH of the prior art, here the hydraulic diameters of Showa's SC condensers fell squarely in a range that Modine had purposefully excluded from its claims to avoid a prior art rejection.

Furthermore, whereas in *Hilton Davis* the exact pH used in the patentee's process did not appear to be of critical importance, in this case Modine stressed throughout the prosecution of its patent, and even in its evidentiary submissions at trial, that the small hydraulic diameter of flow paths is a critical component of its invention's performance. Modine included a performance graph in the specification of the patent (Fig. 5) indicating that as hydraulic diameter increased, heat transfer performance was expected to fall off

substantially. (App'x Vol. II, Fig. 5; App'x Vol. I, 55a-56a) The Court of Appeals' decision that condensers with larger hydraulic diameters could nevertheless be "equivalent" reflects an approach to applying the doctrine that leaves the public unable to discern when a patent holder will be limited to the actual terms of the claims for which patent protection was sought, and unable to determine what limits will apply to the extension of patent coverage beyond that literally claimed subject matter.

As the ITC found, and the Court of Appeals did not dispute, Modine self-evidently understood and anticipated that a competitor might manufacture a parallel flow condenser with hydraulic diameters slightly larger than .040 inch. Having elected to narrow its claims to an upper limit of about 0.040 inch in the belief that such a step was necessary to avoid the prior art and obtain the patent, Modine has sought in this litigation to expand its claims beyond their literal upper limit. The ITC's rejection of Modine's allegations that the hydraulic diameters of the accused Showa condensers were unanticipated equivalents, and its specific findings that Showa independently developed the accused condensers without knowledge of Modine's invention, created ample basis for the ITC to conclude, as it did, that no equitable consideration warranted allowing Modine a range of hydraulic diameter equivalents broader than its literal claims in this case.

If this Court reverses the Court of Appeals' decision in *Hilton Davis*, that decision will invalidate the stated predicate of the Federal Circuit's reversal of the ITC and remand for application of the doctrine of equivalents. Permitting the ITC remand to proceed for application of the doctrine of equivalents when the legal foundation for the Federal

Circuit's decision is currently under Supreme Court review could cause substantial injustice to Showa if *Hilton Davis* is modified or reversed.[5] To avoid this potential for injustice, the Court should either grant this petition for certiorari or, in the alternative, hold the petition until *Hilton Davis* has been decided and then grant the petition and vacate and remand for reconsideration in light of its *Hilton Davis* decision.

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5. The only point of variation between the *Hilton Davis* decision and the present case relates to the issue in that case of whether the applicability of the doctrine of equivalents presents exclusively a jury question or requires a threshold decision for the Court respecting the equitable appropriateness of allowing the patent holder any range of equivalents. This appeal does not directly present any questions about the role of judge and jury, since the applicable statute and ITC rules do not provide for a jury trial on any issue. Nevertheless, the Court of Appeals correctly recognized that its reversal of the ITC still presents the identical substantive issue of whether application of the doctrine of equivalents can or should include a threshold equitable determination of the patent holder's entitlement to equivalents beyond the literal limits of the claims.

CONCLUSION

The Court should grant Petitioners' petition for a writ of certiorari or, in the alternative, hold the petition until *Hilton Davis* has been decided and then grant the petition and vacate and remand for reconsideration in light of *Hilton Davis*.

Dated: New York, New York
March 25, 1996

Respectfully submitted,

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APPENDIX VOLUME I

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Appendix Volume I

Opinion of the United States
Court of Appeals for the Federal Circuit,
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Order of the United States International
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Appendix Volume II

United States Patent No. 4,998,580,
dated March 12, 1992 . . . . . 87a

UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

93-1513

MODINE MANUFACTURING COMPANY,
Appellant,

—v.—

UNITED STATES INTERNATIONAL
TRADE COMMISSION,
Appellee,

and

SHOWA ALUMINUM CORPORATION AND
SHOWA ALUMINUM CORPORATION OF AMERICA,

and

MITSUBISHI MOTORS CORPORATION AND
MITSUBISHI MOTORS SALES OF AMERICA,

and

MITSUBISHI HEAVY INDUSTRIES, LTD. AND
MITSUBISHI HEAVY INDUSTRIES AMERICA, INC.,

Intervenors.

Richard J. Hoskins, Schiff, Hardin & Waite, of Chicago, Illinois, argued for appellant. With him on the brief were *Thomas B. Quinn*, *Stuart I. Graff*, *Patricia J. Thompson* and *Randall M. Whitmeyer*. Also on the brief were *V. James Adduci, II*, *Charles F. Schill* and *Peter B. Martine*, Adduci, Mastriani, Schaumberg & Schill, of Washington, D.C.

Matthew T. Bailey, Attorney, Office of the General Counsel, U.S. International Trade Commission, of Washington, D.C., argued for appellee. With him on the brief were *Lyn M. Schlitt*, General Counsel and *James A. Toupin*, Assistant General Counsel. *John S. Kiernan*, Debevoise & Plimpton, of New York, New York, argued for intervenor, Showa Aluminum Corporation of America. With him on the brief were *James E. Armstrong, III*, *Ronald F. Naughton* and *Joseph J. Zito*, Armstrong, Westerman, Hattori, McLeland & Naughton, of Washington, D.C.

Robert E. Montgomery, Jr. and *Robert P. Parker*, Paul, Weiss, Rifkind, Wharton & Garrison, of Washington, D.C., were on the brief for intervenor, Mitsubishi Heavy Industries, Ltd. and Mitsubishi Heavy Industries America, Inc.

Terrell C. Birch, *Bernard L. Sweeney*, *Charles Gorenstein* and *Terry L. Clark*, Birch, Stewart, Kolasch & Birch, of Falls Church, Virginia, were on the brief for Mitsubishi Motors Corporation and Mitsubishi Motor Sales of America. Of counsel was *Robert J. Kenny*.

Appealed from:
United States International Trade Commission

UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

93-1513

Modine Manufacturing Company,
Appellant,

v.

UNITED STATES INTERNATIONAL TRADE COMMISSION,
Appellee,

and

SHOWA ALUMINUM CORPORATION AND
SHOWA ALUMINUM CORPORATION OF AMERICA,

and

MITSUBISHI MOTORS CORPORATION AND
MITSUBISHI MOTORS SALES OF AMERICA,

and

MITSUBISHI HEAVY INDUSTRIES, LTD. AND
MITSUBISHI HEAVY INDUSTRIES AMERICA, INC.,

Intervenors.

DECIDED: February 5, 1996

Before NEWMAN, MAYER, and CLEVENGER, *Circuit Judges*.

Opinion for the court filed by *Circuit Judge* NEWMAN. *Circuit Judge* MAYER dissents without opinion.

NEWMAN, *Circuit Judge*.

Modine Manufacturing Co. appeals the decision of the United States International Trade Commission,[1] holding that section 337 of the Tariff Act, 19 U.S.C. § 1337, was not violated by the importation of certain automotive condensers. The respondents before the Commission, who participate as intervenors in this appeal, manufacture in Japan and import, sell, and use the accused condensers in the United States: Showa Aluminum Corporation and Showa Aluminum Corporation of America; Mitsubishi Motors Corporation and Mitsubishi Motor Sales of America; and Mitsubishi Heavy Industries, Ltd. and Mitsubishi Heavy Industries America, Inc.

The issues on appeal are the validity and enforceability of Modine's United States Patent No. 4,998,580 (the '580 patent) and infringement by several models of condensers manufactured by Showa and imported, sold, and used by the intervenors. Modine is the appellant on the infringement issues, and the intervenors appeal the issues of validity and enforceability. We vacate the finding of noninfringement and remand for further proceedings based on the correct claim interpretation. On the other issues the Commission's decision is affirmed.

I
THE PATENTED INVENTION

The invention of the '580 patent is described by Modine as a highly efficient and environmentally advanced condenser for use in automotive air conditioning. It is more compact,

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1. *Modine Manufacturing Co. v. United States Int'l Trade Comm'n*, Inv. No. 337-TA-334, April 23, 1993 (Initial Determination), July 23, 1993 (Final Determination), August 5, 1993 (Commission Opinion).

lighter, uses less refrigerant, outperforms prior condensers, and has the additional advantage of being usable with refrigerants other than chlorofluorocarbons. Modine states that it converted the entire industry to a new standard.

Claims 9 and 10 of the '580 patent, the only claims in suit, are shown with emphasis added to point out the two terms that are the focus of the infringement issues:

Claim 9. A condenser for a refrigerant in a cooling system comprising:

[1] a pair of spaced, generally parallel, elongated cylindrical tubes defining headers;

[2] a vapor inlet in one of said tubes;

[3] a condensate outlet from one of said tubes;

[4] said header tubes each having a series of elongated generally parallel slots with the slots in the series on one header tube aligned with and facing the slots in the series on the other header tube;

[5] a tube row defined by a plurality of straight, tubes of flat cross-section and with ***flat side walls*** and having opposed ends extending in parallel between said header tubes, the ends of said flat cross-section tubes being disposed in corresponding aligned ones of said slots and in fluid communication with the interior of said header tubes, at least some of said tubes being in hydraulic parallel with each other;

[6] web means within said flat cross-section tubes and extending between and joined to the flat side walls at spaced intervals to (*a*) define a plurality of discrete, hydraulically parallel flow paths within each flat cross-section tube that extend between said header tubes; to (*b*) absorb forces resulting from internal pressure within said condenser and tending to expand the flat cross-section tubes; and to (*c*) conduct heat between both said flat sides and fluid in said flow paths;

[7] said flow paths being of ***relatively small hydraulic diameter*** which is defined as the cross-sectional area of the corresponding flow path multiplied by four (4) and divided by the wetted perimeter of the corresponding flow path;

[8] serpentine fins incapable of supporting said flat cross-section tubes against substantial internal pressure extending between facing flat side walls of adjacent flat cross-section tubes;

[9] each of said flow paths including at least one elongated crevice extending generally along the length of the associated flow path.

Claim 10. The condenser of claim 9 wherein each flow path has a plurality of said crevices.

It is not disputed that all of the elements of the claimed invention have counterparts in the accused condensers, and that infringement turns on the meaning and scope of the terms "flat side walls" and "relatively small hydraulic diameter." Modine challenges the correctness of the

Commission's claim interpretation and the ensuing finding of non-infringement.

II
INFRINGEMENT

As we have recently held, "[b]ecause claim construction is a matter of law, the construction given the claims is reviewed *de novo* on appeal." *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979, 34 U.S.P.Q.2d 1321, 1329 (Fed. Cir.) (*en banc*), *cert. granted*, 116 S. Ct. 40, 132 L. Ed. 2d 921 (1995). Disputes as to the meaning and scope of terms as used in the claims are determined as a matter of law, based on the patent specification and the prosecution history if it is in evidence. *Id.* at 979-80, 34 U.S.P.Q.2d at 1329-30. As stated in *Markman*, "[w]hen legal 'experts' offer their conflicting views of how the patent should be construed, or where the legal expert's view of how the patent should be construed conflicts with the patent document itself, such conflict does not create a question of fact nor can the expert opinion bind the court or relieve the court of its obligation to construe the claims according to the tenor of the patent. This opinion testimony also does not change or affect the *de novo* appellate review standard for ascertaining the meaning of the claim language." *Id.* at 983, 34 U.S.P.Q.2d at 1333.

A. THE FLAT SIDE WALLS

The Commission, adopting the ALJ's Initial Determination, held that the term "flat side walls" means the interior walls of the condenser tubes, and that although the Showa side walls are flat in that they are not rounded, they are not "flat" because most (but not all) of the Showa models

have fin-like projections on their interior surfaces. On this term construction the Commission concluded that the Showa tubes do not have "flat side walls" and therefore that the claims are not infringed by any of the Showa models.

Modine states that "flat side walls" describes the shape of the tubes, and refers to the '580 specification which describes the condenser tubes as "noncircular in cross section" and as a "flattened tube." Modine states that the side walls are flat whether or not they have fins on their inner surfaces, pointing out that the specification as well as the claims show fins on the outer surfaces as well as webs on the inner surfaces. Claim 9 mentions "flat side walls" in several clauses:

> [5] a plurality of straight tubes of flat cross-section and with flat side walls . . .
>
> [6] web means within said flat cross-section tubes and extending between and joined to the flat side walls ...
>
> * * *
>
> [8] serpentine fins incapable of supporting said flat cross-section tubes against substantial internal pressure extending between facing flat side walls of adjacent flat cross-section tubes;

Clause [5] uses the word "flat" to describe both the cross-section and the side walls, but neither usage of "flat" requires that the interior or exterior wall surfaces be clear, without web or fin. Clause [6] requires a web "joined to" the interior flat side walls, negating the ALJ's reading that the wall surfaces must be clear. Clause [8] describes

serpentine fins on flat side walls that are necessarily the exterior surfaces of the walls, contravening the ALJ's ruling that "flat side walls" means the interior walls.

The entirety of the claim's usage of flat side walls is consistent with the specification's description of the condenser tubes as "flattened" and "not circular." This plain reading is not affected by webs or fins on either the interior or the exterior surfaces of the walls, or by the crevices of claim 10. Indeed, a claim interpretation that would exclude the inventor's device is rarely the correct interpretation; such an interpretation requires highly persuasive evidentiary support, whereas in this case it received none, whether from the specification, the prosecution history, or the prior art.

We conclude that the term "flat side walls" means that the tube structure is flat, as the specification states, and does not prohibit the presence of fins, webs, or other attachments to either the interior or exterior surfaces. Those Showa tubes that bear inner fins (the 3mm models), and those that do not (the 2mm models), all have flat side walls as the term is correctly construed. This claim limitation is not a ground for a finding of noninfringement.

B. RELATIVELY SMALL HYDRAULIC DIAMETER

The Commission held that the claim term "relatively small hydraulic diameter" is a limitation to hydraulic diameters no larger than exactly 0.040 inch. Since the hydraulic diameters of the Showa condensers are all larger than 0.040 inch, the Commission held that the claims are not infringed, literally or under the doctrine of equivalents.

Hydraulic diameter is an engineering designation that measures the flow path within the condenser. It is defined as the cross-sectional area of the corresponding flow path multiplied by four and divided by the wetted perimeter of the corresponding flow path; this definition is included in claim clause [7]. Claims 9 and 10, the claims in suit, describe the hydraulic diameter as "relatively small." Claims not in suit describe the hydraulic diameter as "about 0.015 to 0.040 inches" (claims 1-3), "in the range of 0.015 to 0.040 inches" (claims 4-5), and "sufficiently small . . . so that surface tension and capillary forces acting upon condensate within said flow paths improve heat transfer efficiency" (claims 6-8). The Commission held that "relatively small" in claims 9 and 10 has an upper limit of 0.040 inch.

Ordinarily a claim element that is claimed in general descriptive words, when a numerical range appears in the specification and in other claims, is not limited to the numbers in the specification or the other claims. *See Specialty Composites v. Cabot Corp.*, 845 F.2d 981, 987, 6 U.S.P.Q.2d 1601, 1604 (Fed. Cir. 1988) ("[P]articular embodiments appearing in the specification will not generally be read into the claims . . . . What is patented is not restricted to the examples, but is defined by the words in the claims.") It is usually incorrect to read numerical precision into a claim from which it is absent, particularly when other claims contain the numerical limitation. In *D.M.I., Inc. v. Deere & Co.*, 755 F.2d 1570, 1574, 225 U.S.P.Q. 236, 239 (Fed. Cir. 1985), the court stated:

> Where, as here, the limitation sought to be "read into" a claim already appears in another claim, the rule is far more than "general." It is fixed. It is long and well established. It enjoys an immutable and universally

> applicable status comparatively rare among rules of law. Without it, the entire statutory and regulatory structure governing the drafting, submission, examination, allowance, and enforceability of claims would crumble.

When a limitation is included in several claims but is stated in terms of apparently different scope, there is a presumption that a difference in scope is intended and is real. *Tandon Corp. v. United States Int'l Trade Comm'n*, 831 F.2d 1017, 1023, 4 U.S.P.Q.2d 1283, 1288 (Fed. Cir. 1987). Such a presumption can be overcome, but the evidence must be clear and persuasive. Conversely, it is incorrect to construe a claim as encompassing the scope that was relinquished in order to obtain allowance of another claim, despite a difference in the words used. *See Builders Concrete, Inc. v. Bremerton Concrete Prods. Co.*, 757 F.2d 255, 260, 225 U.S.P.Q. 240, 243 (Fed. Cir. 1985).

All rules of construction must be understood in terms of the factual situations that produced them, and applied in fidelity to their origins. Thus, although Modine stresses the rule that the description of the preferred embodiment in the specification does not limit the claims to that embodiment, when the preferred embodiment is described in the specification as the invention itself, the claims are not necessarily entitled to a scope broader than that embodiment. *See Autogiro Co. of America v. United States*, 384 F.2d 391, 398, 181 Ct. Cl. 55, 155 U.S.P.Q. 697, 703 (Ct. Cl. 1967) ("where the patentee describes an embodiment as being the invention itself and not only one way of utilizing it," this description guides understanding the scope of the claims).

Modine accurately states that the '580 specification describes "about 0.015-0.040 inch" as the "preferred embodiment." However, it is the only embodiment remaining for, as we shall discuss, the broader range of 0.015-0.070 inch was removed from the specification on refiling of the patent application. Modine thus limited the invention of the '580 patent to hydraulic diameters in the range of about 0.015-0.040 inch. Although Modine states that it neither abandoned, nor intended to abandon, the broader range of hydraulic diameters, and is prosecuting in another application claims that include hydraulic diameters up to 0.07 inch, that does not control the construction of the claims of the '580 patent.

Thus we agree with the Commission that "relatively small" in claims 9 and 10, interpreted in light of the '580 specification and the prosecution history, is not entitled to the range of up to 0.070 inch as sought by Modine. However, the Commission erred in literally restricting the hydraulic diameter range to an upper limit of exactly 0.040 inch, and in barring access to the doctrine of equivalents. *See Hilton Davis Chem. Co. v. Warner-Jenkinson Co.*, 62 F.3d 1512, 1522, 35 U.S.P.Q.2d 1641, 1648 (Fed. Cir. 1995) (*en banc*) ("The trial judge does not have discretion to choose whether to apply the doctrine of equivalents when the record shows no literal infringement.")

1. The Specification and the Prosecution History

The '580 patent evolved from two continuation-in-part applications. The first-filed application, called the "grandparent," described condenser tubes with flow paths having hydraulic diameters in the range of "about 0.015-0.070" inch. The specification stated that "heat

transfer is increased in the range of hydraulic diameters of about 0.015 inches to about 0.070 inches through the use of the invention with some variance depending upon air flow." The specification also stated that the preferred range was "about 0.015-0.040" inch. The specification included a graph of heat transfer as a function of hydraulic diameter, and described the graph as showing improved performance at hydraulic diameters up to about 0.070 inch.

In the second-filed application, called the "parent," the hydraulic diameter upper limit of "about 0.070" inch in the grandparent was replaced, at every occurrence in the text, with "about 0.040" inch. The graph showing improved performance at hydraulic diameters up to 0.070 inch was retained in the application, but the explanatory text now described the graph as showing that

> heat transfer is advantageously and substantially increased in the range of hydraulic diameters of about 0.015 inches to about 0.040 inches through the use of the invention with some variance depending upon air flow.

In the ensuing prosecution, when the examiner objected that the specification did not show "criticality" of the 0.015-0.040 inch range, Modine argued that this was the peak range "and it is this peak heat range that is sought to be covered by the applicant." During prosecution of the parent application Modine told the patent examiner of the "Cat-Folded Front" condenser that was made by Modine for the Caterpillar Company for use in tractors, and sold more than a year before the filing date of the grandparent application. The Cat condenser had several structural differences from the condenser described in these

applications: it had an overall hydraulic diameter of 0.0496 inch (or 0.04822, the record shows both figures); it did not have a web joined to the tube walls; and it did not have a plurality of elongated crevices in the flow paths. The Cat condenser was treated as prior art, along with several cited references.

Modine again refiled the patent application (the "child" application), without further change in the description of the hydraulic diameter. Although Modine points out that hydraulic diameters up to 0.070 inch continued to be shown in the graph that appeared in all three applications, the replacement of 0.070 with 0.040 in the text requires the conclusion that the applicant limited the invention described in the refiled applications to hydraulic diameters of up to about 0.040 inch.

Modine argues that the limitation in the parent/child specifications to hydraulic diameters of about 0.015-0.040 inch was not required by the prior art, pointing out that it is appropriate to consider not only the changes made during prosecution but also the reason for the changes. *See Insta-Foam Prods., Inc. v. Universal Foam Sys., Inc.*, 906 F.2d 698, 703, 15 U.S.P.Q.2d 1295, 1298 (Fed. Cir. 1990) ("A close examination must be made as to not only what was surrendered, but also the reason for such a surrender.") Although Modine may be correct that it was not necessary to reduce 0.070 to 0.040, this change was conspicuous and unambiguous. It was made in the context of the cited references and the Cat condenser, and the interested public is entitled to rely on it in interpreting the claim term "relatively small" as used in the '580 patent.

2. The Incorporation by Reference

The '580 specification incorporates by reference a patent entitled "Method of Making a Heat Exchanger," U.S. Patent No. 4,688,311 (the '311 patent). The '580 specification states that the '311 patent describes a "highly preferred means by which the tubes 20 with accompanying spacers 40 may be formed." Modine places great weight on this incorporation to support its position that "relatively small" is correctly construed to mean hydraulic diameters up to 0.07 inch, for the '311 patent states:

> The invention may be used with particular efficacy where the flow passages are to be of relatively small hydraulic diameter as, for example, 0.07 inches or less. When such dimension is selected, particularly where the hydraulic diameter is 0.040 inches or less, the structure is ideal for utilization in a high efficiency condenser.

Modine stresses that the '311 patent defines "relatively small" as "0.07 inch or less," and that incorporation by reference has the same effect as if the host patent had set forth the entire text of the incorporated document. *See In re Lund*, 376 F.2d 982, 989, 153 U.S.P.Q. 625, 631 (C.C.P.A. 1967).

However, incorporation by reference does not convert the invention of the incorporated patent into the invention of the host patent. The use of "relatively small" to describe the condenser flow paths to which the '311 manufacturing method is applicable did not reinstate into the parent and the child applications the hydraulic diameter range that was

deleted from the grandparent. The words "relatively small" appear only once in the '580 specification, and do not change the presentation of the invention as defined by the hydraulic diameter numerical range stated throughout the specification:

> In addition to the utilization of a relatively small hydraulic diameter for the flow paths as mentioned previously, as another facet of the invention, it is contemplated that each of the flow paths have at least one crevice preferably extending along the entire length of the flow path, . . .

"Relatively small" does not appear to have an independent meaning in this art that would distinguish between 0.040 and 0.070 inch. In view of the replacement of the "relatively small" parameter of about 0.070 in the grandparent application with the "relatively small" parameter of about 0.040 in the parent and child applications, it does not appear to be correct to read the scope of "relatively small" in the '311 patent as overriding that replacement.

3. The Prosecution of Claims 9 and 10 (Application Claims 27 and 28)

The claims in suit were added near the end of the prosecution of the child application, and contain the only usage of "relatively small" in the claims. During prosecution Modine cancelled allowed claim 10 and added application claims 25-28. Modine points out that when application claims 25-28 were added Modine told the examiner that the claims were broader than allowed application claim 10 in some respects and narrower in others:

> New Claim 25 is somewhat like original Claim 10 although it is broader in some respects and narrower in others.
>
> . . .
>
> As regards new Claims 25-28, independent Claim 25 is basically directed to the improved strength characteristic of the invention. See page 7 of the application as filed. Should the Examiner believe it to be dispositive, or otherwise helpful in determining the patentability of these claims, counsel notes that when the hoop strength containment feature of the Cat folded front type tubes is removed by removing the plate fins at the rounds of the flattened tubes, that is, at the radius of the flattened tubes, deformation and/or bursts occur at about 1,800 PSI; whereas the tubes of the present invention remained intact at pressures at least as high as 2,000 PSI. These sort of results are believed to commend the patentability of independent Claim 25.

Thus in presenting this group of claims Modine focused on the additional strength assertedly provided by the web means, not that these claims broadened the scope of the hydraulic diameter. Independent claim 25 used the words "relatively small hydraulic diameter." Showa argues, and we agree, that the examiner viewed all the claims as referring to the hydraulic diameter range of 0.015 to 0.04, for the examiner stated at one point during the prosecution of this claim:

> Therefore, to achieve increased heat transfer and to save on material consumption it would have been obvious to one of ordinary skill in the art of heat exchange to reduce the hydraulic diameter of flow passages to within

the claimed range of 0.015 to 0.04 as taught by Asselman et al.

The examiner persisted in the rejection of application claims 25 and 26, but held that claims 27 and 28 were allowable. In view of the prosecution history, we conclude that "relatively small" in application claims 27 and 28 (patent claims 9 and 10) did not enlarge the range of hydraulic diameters beyond that described in the specification as the invention.

The specification and prosecution history of the '580 patent do not permit a construction of "relatively small" to include the 0.070 inch range that was described in the grandparent application, when that range was reduced in the parent and child to about 0.040 inch. However, neither are the claims correctly construed as limited to exactly 0.040 inch. Although the Commission correctly held that "relatively small" in claims 9 and 10 is limited by the description of the invention in the specification, the Commission incorrectly limited the hydraulic diameter to exactly 0.040 inch, for that is not the description in the specification and is not required by the prosecution history.

The specification uses the qualifier "about," and also states that the optimum hydraulic diameter varies with the conditions. Such broadening usages as "about" must be given reasonable scope; they must be viewed by the decisionmaker as they would be understood by persons experienced in the field of the invention. *Andrew Corp. v. Gabriel Electronics, Inc.*, 847 F.2d 819, 821-22, 6 U.S.P.Q.2d 2010, 2013 (Fed. Cir.), *cert. denied*, 488 U.S. 927, 109 S. Ct. 312, 102 L. Ed. 2d 330 (1988). Although it is rarely feasible to attach a precise limit to "about," the

usage can usually be understood in light of the technology embodied in the invention. When the claims are applied to an accused device, it is a question of technologic fact whether the accused device meets a reasonable meaning of "about" in the particular circumstances. Thus we turn to the factual aspects of the infringement determination.

. .

C. LITERAL INFRINGEMENT

The record shows hydraulic diameter ranges of the nine Showa models before the Commission as follows: 0.0484-0.0519 inch; 0.0453-0.0520 inch; 0.0477-0.0577 inch; 0.0577-0.0606 inch; 0.0482-0.0497 inch; 0.061-0.065 inch; 0.0445-0.0682 inch; 0.0424-0.0573 inch; and 0.0513-0.0547 inch. The ALJ also referred to a model having a range of 0.0453-0.0477 inch. The Commission, incorrectly limiting "relatively small" to precisely 0.040 inch, did not consider variability based on the nature of the coolant, as stated in the specification, and did not determine whether any of the Showa models were within a reasonable literal scope of "relatively small" interpreted as meaning "about 0.015-0.040" inch.

Precedent illustrates the fact-dependency of determinations of the technologic scope of "about" and similar terms, depending on their contexts and the precision or significance of the measurements used. *See, e.g., Quantum Corp. v. Rodime, PLC*, 65 F.3d 1577, 36 U.S.P.Q.2d 1162 (Fed. Cir. 1995) (the addition of "approximately" during reexamination was a significant broadening of the claims); *Hybritech, Inc. v. Abbott Labs.*, 849 F.2d 1446, 1455, 7 U.S.P.Q.2d 1191, 1199 (Fed. Cir. 1988) ("at least about 10^8 liters/mole" is literally satisfied by 4.8×10^7 liters/mole and 7.1 to 7.5×10^7 liters/mole);

W.L. Gore & Assoc., Inc. v. Garlock, Inc., 842 F.2d 1275, 1280, 6 U.S.P.Q.2d 1277, 1282 (Fed. Cir. 1988) (an "imprecise limitation, such as the phrase 'about 100% per second'" is to be considered in determination of infringement); *Rosemount, Inc. v. Beckman Instruments, Inc.*, 727 F.2d 1540, 1546-47, 221 U.S.P.Q. 1, 7 (Fed. Cir. 1984) ("'close proximity' is as precise as the subject matter permits").

The Commission's determination of literal infringement was based on a hydraulic diameter limit of exactly 0.040 inch, with no consideration of the scope of "about" and no determination of the effect of relevant factors such as the nature of the coolant and the precision of measurement. The finding of non-infringement was based on an incorrect claim construction, leading to an inadequate application of the claims to the accused devices. The finding is vacated. On remand the Commission shall determine whether any of the accused condenser models literally infringes the claims, upon construction of the claim term "relatively small" as meaning a hydraulic diameter in the range of about 0.015-0.040 inch, and upon applying the claims to the various accused Showa models.

D. INFRINGEMENT BY EQUIVALENCY

The Commission held that the doctrine of equivalents did not apply because Showa did not "unscrupulously" copy the Modine condenser. This ruling was based on an incorrect view of the law. As was explained in *Hilton Davis*, 62 F.3d at 1522, 35 U.S.P.Q.2d at 1648, there is no equitable threshold for determination of the factual question of infringement by equivalency. Although the ALJ received evidence on the facts relevant to equivalency, the findings

were made in the context of an incorrect view of prosecution history estoppel, the ALJ holding that Modine's claims were limited to hydraulic diameters no larger than exactly 0.040 inch. The ALJ's determination of estoppel was based on the same factors that led to the incorrect claim interpretation.

Modine argued to the Commission that the teachings in the specification, including the graph showing superior coolant activity up to a hydraulic diameter of 0.070 inch, support a range of equivalents up to 0.070 inch.

Modine alternatively argued that even if the Commission found that Modine was not entitled to this range of equivalents, it is entitled to establish equivalency up to the overall hydraulic diameter of the prior art Cat condenser, *i.e.* about 0.48-0.49 inch.

Discussing the imported accused condensers, the ALJ found as fact that their function and result are the same as those of the claimed invention, but that the imported condensers do not meet the "same way" test because of the presence of internal fins in some of the Showa models. However, Modine's evidence was substantially unrebutted that the presence of inner fins did not substantially change the way the condensers function, by surface tension and capillary forces. Although the intervenors argue that their condensers with larger hydraulic diameters are less efficient, equal performance is not required to establish equivalency. *Laitram Corp. v. Cambridge Wire Cloth Co.*, 863 F.2d 855, 859, 9 U.S.P.Q.2d 1289, 1294 (Fed. Cir. 1988), *cert. denied*, 490 U.S. 1068, 109 S. Ct. 2069, 104 L. Ed. 2d 634 (1989). The ALJ's finding is against the heavy weight of the evidence. There was not substantial evidence supporting the finding of non-equivalence.

However, the ALJ correctly recognized that prosecution history estoppel limits the application of the doctrine of equivalents, even when the function/way/result or other test of equivalency is met by the accused devices. Prosecution history estoppel implements the principle that a patentee can not obtain, in an infringement suit, protection of subject matter that was relinquished in order to obtain allowance of other subject matter during prosecution of the patent application. *Mannesmann Demag Corp. v. Engineered Metal Prods. Co.*, 793 F.2d 1279, 1285, 230 U.S.P.Q. 45, 48 (Fed. Cir. 1986) (the relinquished subject matter must be material to the issuance of the patent). The standard for determining whether particular subject matter was relinquished and was material is an objective one which we determine as a matter of law, *LaBounty Mfg., Inc. v. United States Int'l Trade Comm'n*, 867 F.2d 1572, 1576, 9 U.S.P.Q.2d 1995, 1998 (Fed. Cir. 1989), and is based on the reasonable reading, by a person of skill in the field of the invention, of the entire prosecution history.

We have discussed the prosecution history *ante*, and concluded that in connection with the patent application that led to the '580 patent, Modine relinquished the range of hydraulic diameters that extended to 0.070 inch, based in substantial part on the hydraulic diameter of the prior art Cat-Folded Front condenser. Although Modine points out that the '580 invention differs in several respects from the Cat condenser, the prosecution history shows that the hydraulic diameter of the Cat condenser was a factor in limitation of the '580 claims. The change in the description of the hydraulic diameter in the specification from grandparent to parent/child application, and the arguments to the patent examiner, highlighted the applicant's action in distinguishing the '580 claims from the Cat condenser.

Thus we conclude that the available range of equivalency is limited, by estoppel, to the hydraulic diameter of the Cat condenser. Within this boundary, however, the prosecution history and the prior art do not eliminate equivalents if substantial identity is shown. The controlling criterion, as reaffirmed in *Hilton Davis*, 62 F.3d at 1518, 35 U.S.P.Q.2d at 1645, is whether the accused device is substantially the same as the claimed invention. *See Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 607 (1950) (insubstantial changes do not avoid the application of the doctrine of equivalents).

The ALJ incorrectly held that Modine was estopped to assert equivalency against any condenser with a hydraulic diameter larger than exactly 0.040 inch. The holding is vacated, and the case is remanded to the Commission for findings in accordance with the doctrine of equivalents.

III
VALIDITY AND ENFORCEABILITY

The Commission held that the '580 patent was valid and enforceable. The intervenors appeal these holdings, stating that there is an on-sale bar, that the claims are invalid for obviousness or indefiniteness, and that Modine committed inequitable conduct in its prosecution of the '580 patent.

A. PRIOR SALE, 35 U.S.C. § 102(b)

If Modine is entitled to the filing date of its grandparent or parent application, 35 U.S.C. § 120, the parties agree that there is no on-sale bar based on Modine's own sales of the claimed condenser. The Commission found that the two-pass condenser, as it was described in various documents, was

described as well as enabled in the parent application. Although Mitsubishi argues that the claims of the parent application did not describe a two-pass condenser, the Commission found, and we agree, that the disclosure was present in the specification. A later application is entitled to the earlier filing date for all common subject matter that is contained in the earlier application, whether the subject matter appears in the body of the specification or in the claims or drawings.

The Commission found that the parent application adequately described, in compliance with 35 U.S.C. § 112 ¶ 1, the subject matter that is now claimed. *See Ralston Purina Co. v. Far-Mar-Co. Inc.*, 772 F.2d 1570, 1574, 227 U.S.P.Q. 177, 178 (Fed. Cir. 1985). The Commission's findings are supported by substantial evidence. The determination that there is not an on-sale bar is affirmed.

B. OBVIOUSNESS, 35 U.S.C. § 103

The Commission held that invalidity based on obviousness had not been established, in that there was no teaching or suggestion that prior art condensers should be modified in the several ways that are embodied in the '580 invention. The Commission appropriately considered the superior results achieved, the long-felt need for an automotive condenser that would overcome the limitations in cooling capacity and coolant nature that had been reached by conventional automotive condensers, and the commercial success of the '580 invention. The Commission observed that reduction of hydraulic diameter had previously been associated with an undesirable increase in refrigerant-side pressure drop, and that Modine's result was unexpected as well as superior.

Reversible error has not been shown in the Commission's determination that the patent is not invalid on the ground of obviousness. The decision is affirmed.[2]

C. INDEFINITENESS, 35 U.S.C. § 112

The intervenors argue that the claims are invalid for indefiniteness if "relatively small" is construed as larger than exactly 0.040 inch. The ALJ had adopted this position. However, as we have discussed *ante*, technical terms are not *per se* indefinite when expressed in qualitative terms without numerical limits.

When claims are amenable to more than one construction, they should when reasonably possible be interpreted so as to preserve their validity. *Whittaker Corp. by Technibilt Div. v. UNR Indus., Inc.*, 911 F.2d 709, 711, 15 U.S.P.Q.2d 1742, 1744 (Fed. Cir. 1990); *ACS Hosp.*

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2. Although the substantive aspects are mooted by our affirmance with respect to this issue, we have considered Modine's appeal of a discovery-related decision, to the following extent. Modine complains that the ALJ refused to reopen the record to receive newly discovered evidence relevant to the issue of obviousness. Modine states that this evidence was within the clear scope of the agreed discovery, was highly relevant to Showa's challenge to validity, and was deliberately withheld.

   The issue is not, as the Commission and the intervenors state, whether the ALJ had discretion to refuse to open the record because of the imminent deadline for filing the Initial Determination. The issue is whether the Commission should ignore an asserted noncompliance with agreed discovery. The Commission's statutory deadlines place a special responsibility not only on the parties, but on the Commission. Should a party withhold with impunity clearly relevant information that had been reasonably requested, the integrity and value of the ensuing Commission decision is jeopardized.

Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 932 (Fed. Cir. 1984). In this case the specification itself used the terms "relatively small," and "about 0.015-0.040," and the construction required to preserve the claims' validity was simply that "relatively small" and "about 0.015-0.040" not include invalidating prior art. It was evident from the prosecution history that the patentability of claims 9 and 10 did not require an exact numerical limit of the hydraulic diameter. Mathematical precision should not be imposed for its own sake; a patentee has the right to claim the invention in terms that would be understood by persons of skill in the field of the invention. *See Shatterproof Glass Corp. v. Libbey-Owens Ford Co.*, 758 F.2d 613, 624, 225 U.S.P.Q. 634, 641 (Fed. Cir.), *cert. dismissed*, 474 U.S. 976, 106 S. Ct. 340, 88 L. Ed. 2d 326 (1985) ("if the language is as precise as the subject matter permits, the courts can demand no more").

Thus although we do not endorse the Commission's reason, the Commission's holding that the claims are not invalid for indefiniteness is affirmed.

D. INEQUITABLE CONDUCT

The Commission held that the '580 patent was not unenforceable for inequitable conduct, finding that there was no withholding of material information with intent to deceive or mislead the patent examiner into granting the patent. Both materiality and intent are essential factual predicates of inequitable conduct, and each must be proved by clear and convincing evidence. *Kingsdown Medical Consultants, Ltd. v. Hollister Inc.*, 863 F.2d 867, 9 U.S.P.Q.2d 1384 (Fed. Cir. 1988) (*en banc*), *cert. denied*, 490 U.S. 1067, 109 S. Ct. 2068, 104 L. Ed. 2d 633 (1989).

The ALJ had criticized Modine's choice of the data that were included in the grandparent application as filed, for Modine had replaced a graph of computer-generated heat transfer data, that appeared in an early draft of the patent application, with later-obtained data and comparison with a different prior art condenser. Modine explained at trial the flaws in the first set of data, and the reasons for the change to data that were believed to be more accurate and to present a more useful comparison. Although there was no challenge at trial to either the correctness or the veracity of this explanation, the ALJ nonetheless found that Modine intended to deceive the patent examiner. The ALJ also criticized Modine's description of the prior art and the arguments presented to the examiner concerning the prior art.

The Commission found that comparative data with Modine's most efficient prior condenser were included in graphs in the patent application, and that certain computer-generated early data were replaced with more accurate data. Substantial evidence supports the Commission's findings that there was neither material withholding nor intent to deceive in Modine's selection of data and in the prosecution of the patent application. We remark that the rule of *Kingsdown* evolved in response to the "plague" of collateral attacks, of which this is an example, wherein routine patent practice is challenged without substance. *See Northern Telecom, Inc. v. Datapoint Corp.*, 908 F.2d 931, 939, 15 U.S.P.Q.2d 1321, 1327 (Fed. Cir. 1990).

The holding that there was not inequitable conduct is affirmed.

Summary

Having interpreted the claims *de novo*, we vacate the Commission's rulings on the issues of infringement, and remand for findings and redetermination with respect to literal infringement and infringement under the doctrine of equivalents. In all other respects the Commission's decision is affirmed.

AFFIRMED IN PART,
VACATED IN PART, AND REMANDED

MAYER, *Circuit Judge*, dissents.

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C. 20436

Index No. 337-TA-334

In the Matter of

CERTAIN CONDENSERS, PARTS THEREOF AND PRODUCTS CONTAINING SAME, INCLUDING AIR CONDITIONERS FOR AUTOMOBILES

ORDER

On January 13, 1992, the Commission voted to institute an investigation of a complaint filed by Modine Manufacturing Company ("Modine") under section 337 of the Tariff Act of 1930 (19 U.S.C. § 1337). Modine's complaint alleged infringement of claims of U.S. Letters Patent 4,998,580 in the importation and sale of certain condensers used in automobile air conditioning systems. Notice of the investigation was published in the *Federal Register* on January 23, 1992. 57 *Fed. Reg.* 2784-85.

On April 26, 1993, the presiding administrative law judge (ALJ) issued an initial determination (ID) finding no violation of section 337 in the investigation. Complainant and the Commission investigative attorney filed petitions for review of the ID on May 6, 1993. Respondents filed

a joint response to the petitions on May 18, 1993. On June 25, 1993, the Commission determined to review the issues of validity, enforceability, and importation. 58 *Fed. Reg.* 36701-2 (July 8, 1993). The Commission did not seek or receive any briefs on review.

The issues decided in the ID which were not reviewed by the Commission became the determination of the Commission. Since the Commission did not review the dispositive issues of claim interpretation and patent infringement, the ID's finding of no violation was adopted by the Commission.

Having considered the subject ID, the petitions for review, the replies thereto, and the record in this investigation, it is hereby ORDERED THAT --

1. The ID's conclusion that the parent patent application did not enable a two-pass condenser under 35 U.S.C. § 112, first paragraph, is reversed;
2. The ID's conclusion that the claims at issue are invalid under 35 U.S.C. § 102(b) is reversed;
3. The ID's conclusion that the claims at issue are invalid under 35 U.S.C. § 103 is reversed;
4. The ID's conclusion that the claims at issue are not indefinite under 35 U.S.C. § 112, second paragraph, is affirmed;
5. The ID's conclusion that the claims at issue are unenforceable due to inequitable conduct in their procurement is reversed;
6. The Commission finds that importation of the accused condensers has occurred;

7. Investigation No. 337-TA-334 is terminated on the basis that there is no violation of section 337;
8. The Commission will retain jurisdiction over the administrative protective order while it considers issues of post-termination document retention; and
9. The Secretary shall serve copies of this Order, and the Commission Opinion in support thereof (to be issued separately) upon each party of record in this investigation and on the Department of Health and Human Services, the Department of Justice, and the Federal Trade Commission, and publish notice thereof in the *Federal Register*.

By order of the Commission.

/s/
Donna R. Koehnke
Secretary

Issued: July 23, 1993

UNITED STATES
INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C. 20436

In the Matter of CERTAIN CONDENSERS, PARTS THEREOF AND PRODUCTS CONTAINING SAME, INCLUDING AIR CONDITIONERS FOR AUTOMOBILES	Investigation No. 337-TA-334

INITIAL DETERMINATION

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* * *

PROCEDURAL HISTORY AND JURISDICTION

On December 12, 1991, complainant Modine Manufacturing Company filed a complaint alleging that respondents Showa Aluminum Corporation, Mitsubishi Heavy Industries Ltd., Mitsubishi Heavy Industries America Inc., Mitsubishi Motors Corporation and Mitsubishi Motors Sales of America had violated Section 337 of the Tariff Act as amended.

In its complaint Modine alleged that Showa manufactured for import into the United States certain automobile air-conditioning condensers and parts thereof that were imported into the United States and that infringed claims 6, 8, 9 and 10 of U.S. Letters Patent 4,998,580. (Showa Ex. 2). The inventors named in the patent are Leon A. Guntly and Norman F. Costello. The assignee of the patent is Modine Manufacturing Company, the complainant. The PF condenser is the parallel flow condenser made by Modine. (Tr. 63.) The SC, or Super Compact condenser, is the parallel flow condenser made by Showa. Modine originally asserted that Showa was infringing claims 6, 8, 9 and 10 of the '580 patent, but it withdrew all allegations of infringement of claims 6 and 8 shortly before trial.

On January 3, 1992, the Commission instituted an investigation to determine whether there had been a violation of Section 337 in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain condensers, parts thereof or products containing same, including air conditioners for automobiles, by reason of infringement of

claims 6, 8, 9 or 10 of U.S. Letters Patent 4,998,580, and whether there exists an industry in the United States as required by Section 337.

In February, 1992, the respondents filed motions for summary determination and termination of investigation (Motions No. 334-1 and 334-2). After these motions were briefed by the parties, they were granted on April 14, 1992. While the motions for summary determination were being reviewed, the parties agreed among themselves to suspend discovery. After review, the Commission reversed on November 18, 1992. Because so much time had elapsed, the Commission designated the case more complicated so that the statutory deadline could be met. The Commission ordered that a hearing be held and that an initial determination be issued by April 23, 1993. A one-week hearing ended on February 12, 1993. Posthearing briefs were filed by all the parties and briefing continued until April 5, 1993.

In the motions for summary determination, the only issue raised was whether condensers with flow paths having hydraulic diameters larger than 0.051 inch were covered by the '580 patent claims in issue. In the hearing, however, complainant alleged that respondents had imported infringing condensers with flow paths having hydraulic diameters smaller than 0.051 inch, and a large number of other issues were litigated.

The Commission has jurisdiction under Section 337 of the Tariff Act as amended over the subject matter set forth in the notice of investigation. The Commission has personal jurisdiction over all of the parties in the case. All parties participated in the hearing and filed briefs.

VALIDITY

The '580 patent was issued on March 12, 1991, and assigned to complainant Modine. The subject matter of the '580 patent is a condenser, which is a type of heat exchanger.

A typical air conditioning system includes a compressor, a condenser, an expansion valve, and an evaporator. Refrigerant liquid or vapor is cycled through these four components. Tr. 125-126. The compressor pumps hot refrigerant vapor into the condenser where air on the outside of the tubes cools the tubes. Tr. 125-126. As heat moves from the refrigerant through the condenser tubes into the air flowing through the condenser, the refrigerant cools from a vapor to a liquid before it leaves the condenser. Tr. 620-622. The liquid refrigerant goes out of the condenser through an outlet in a header tube, and flows through an expansion valve into the evaporator. Showa Phys. Ex. A at 181. In the tubes of the evaporator, the liquid refrigerant absorbs heat from the air flowing through the evaporator. Tr. 126-127. As it absorbs heat, the refrigerant changes into a vapor, enters the condenser through an inlet in a header tube, and the cycle is repeated. Tr. 125-127.

In the first part of the condenser, hot refrigerant vapor passes through flattened metal condenser tubes where heat is transferred to the air around the tubes. Inside these flattened tubes there may be "flow paths" which form discrete channels for the refrigerant. The rate at which heat is exchanged can be varied by changing the size, shape and number of the condenser tubes, the flow paths in these

tubes, and the fins outside of the condenser tubes. For example, if a flow path in the condenser tube is too small, the refrigerant will meet resistance and not move through the flow path as quickly. The "refrigerant-side pressure drop" increases, and heat transfer declines. If two or more flow paths are formed inside the tube, instead of just one, each flow path can be smaller but the refrigerant-side pressure drop will be limited. This increases heat transfer through the tube to the outside air. The condenser designer tries to vary the size, shape and number of the elements in the condenser to achieve the best rate of heat transfer in as small a space as possible.

The parallel flow condenser of claims 9 and 10 of the '580 patent has two headers opposite one another separated by a series of straight parallel tubes between the two headers. Headers are defined in claim 9 (which relates to a parallel flow condenser) as a pair of spaced, generally parallel, elongated cylindrical tubes.

CONSTRUCTION OF CLAIMS 9 AND 10

Only claims 9 and 10 of the '580 patent are in issue here. Claims 9 and 10 are as follows:

9. A condenser for a refrigerant in a cooling system comprising:

a pair of spaced, generally parallel, elongated cylindrical tubes defining headers;

a vapor inlet in one of said tubes;

a condensate outlet from one of said tubes;

said header tubes each having a series of elongated generally parallel slots with the slots in the series on one header tube aligned with and facing the slots in the series on the other header tube;

a tube row defined by a plurality of straight, [sic] tubes of flat cross-section and with flat side walls and having opposed ends extending in parallel between said header tubes, the ends of said flat cross-section tubes being disposed in corresponding aligned ones of said slots and in fluid communication with the interiors of said header tubes, at least some of said tubes being in hydraulic parallel with each other;

web means within said flat cross-section tubes and extending between and joined to the flat side walls at spaced intervals to (a) define a plurality of discrete, hydraulically parallel flow paths within each flat cross-section tube that extend between said header tubes; to (b) absorb forces resulting from internal pressure within said condenser and tending to expand the flat cross-section tubes; and to (c) conduct heat between both said flat sides and fluid in said flow paths, *said flow paths being of relatively small hydraulic diameter* which is defined as the cross-sectional area of the corresponding flow path multiplied by four (4) and divided by the wetted perimeter of the corresponding flow path; serpentine fins incapable of supporting said flat cross-section tubes against substantial internal

pressure extending between facing flat side walls of adjacent flat cross-section tubes; each of said flow paths including at least one elongated crevice extending generally along the length of the associated flow path. (Emphasis added.)

10. The condenser of claim 9 wherein each flow path has a plurality of said crevices.

The "terms of a claim must be interpreted with regard to the other claims, the specifications and the prosecution history." *Jonsson v. Stanley Works*, 903 F.2d 812, 819, 14 U.S.P.Q.2d 1863, 1870 (Fed. Cir. 1990). Unless the terms of a claim are so plainly self-defining that no reference to other sources is necessary, each of these components will be relevant to the interpretation of the claims. *E.I. DuPont de Nemours & Co. v. Phillips Petroleum Co.*, 849 F.2d 1430, 1438, 7 U.S.P.Q.2d 1129, 1135 (Fed. Cir.), *cert. denied*, 488 U.S. 986 (1988); *McGill, Inc. v. John Zink Co.*, 736 F.2d 666, 673-675, 221 U.S.P.Q. 944, 948-50 (Fed. Cir.), *cert. denied*, 469 U.S. 1037 (1984).

In construing the claims in this case it is important to note what the applicant for the patent, or more accurately Modine's attorney speaking for his client, told the examiner in the prosecution history about what he meant when he used certain words and phrases. The applicant told the examiner what his invention was, what each claim was intended to cover, what was in the prior art, how the applicant distinguished the prior art from his invention, and what subject matter he surrendered in order to obtain

allowance of the claims. The prosecution history includes what became the '580 patent specification and all the claims that were allowed.

Patent claims are presumed to be valid. If there is a construction of a claim that would allow the claim to be found to be valid, and the applicant did not give up this construction in the prosecution history, the presumption of validity lends weight to this construction of the claim.

Claims 9 and 10 must be given the same construction for the purposes of validity and infringement. Claims should be construed in light of what was said by the patentee in the prosecution history *before* specific infringement issues are considered. *Lemelson v. United States*, 752 F.2d 1538, 1549, 224 U.S.P.Q. 526, 532 (Fed. Cir. 1985). Anyone who wanted to design around a patent and had gone to the prosecution history to determine what the claims meant before he designed his own product to avoid the claims is entitled to depend on the claim being construed in the context of the prosecution history and the patent itself.

The principal phrases in claims 9 and 10 requiring construction are "relatively small hydraulic diameter" and "web means within said flat cross-section tubes and extending between and joined to the flat side walls."

The meaning of the phrase
"relatively small hydraulic diameter"

Both claims 9 and 10 describe flow paths of "relatively small hydraulic diameter." The phrase "relatively small" in claim 9 is not precise and must be construed to determine how small the hydraulic diameter must be. The

specific issue is whether the term "relatively small hydraulic diameter" can be construed as covering condenser tubes with flow paths having hydraulic diameters of greater than 0.040 inch. Hydraulic diameter is defined in claim 9 itself at p. 6 above.

The Prosecution History: The prosecution history will be discussed here in some detail in connection with the construction of the term "relatively small hydraulic diameter", but it is relevant to other issues and will not be repeated in this detail elsewhere.

The Grandparent application: Modine filed the Grandparent application for what became the '580 patent on October 2, 1985. Showa Ex. 3. Each claim in the Grandparent recited condenser tubes with "flow paths having a hydraulic diameter in the range of about 0.015 to 0.07 inches." *Id.* at 17-19. The specification described this range of 0.015 to 0.070 inch as the range of the invention. *Id.* at 6, 9, 11. "As can be appreciated from Fig. 3, heat transfer is increased in the range of hydraulic diameters of about 0.015 inch to about 0.07 inch through the use of the invention with some variance depending upon air flow." *Id.* at 11. Figure 3 was a graph that compared the heat transfer performance of the claimed invention to that of the prior art. *Id.* at 28.

The examiner rejected all nine claims of the Grandparent, stating that the claimed invention and the claimed range of hydraulic diameters were obvious in light of the prior art. *Id.* at 35-37. Modine then abandoned the application. *Id.* at 45.

The Parent Application: Modine filed the Parent application on September 5, 1986. Showa Ex. 4. The

specification and claims of the Parent were almost the same as those in the Grandparent application, with one exception: The 0.015 to 0.070 inch hydraulic diameter range disappeared completely, without explanation. In every place where that range had appeared in the Grandparent, the range of 0.015 to 0.040 inch now appeared. *Id.* at 115, 119-20, 122. The text accompanying Figure 3 was changed to show improved heat transfer in the narrower range. *Id.* at 122.

When the examiner objected to the Parent specification under 35 U.S.C. § 112, stating that he was "unclear how the specification supports the criticality of the hydraulic diameter range 0.015-0.040 inches" (*id.* at 149), Modine argued "the criticality of hydraulic diameter and the range specified." *Id.* at 161. Modine stated that Figure 3 "shows that peak heat transfer according to the invention is achieved in this range of hydraulic diameters and it is this peak area that is sought to be covered by the applicant." *Id.*

Modine did not expressly surrender its claims to hydraulic diameters between 0.040 and 0.070 inch in the Parent application until Modine disclosed to the examiner the prior art Cat condenser. The Cat condenser had individual flow paths with hydraulic diameters of 0.0382 to 0.0448 inch, and Modine told the examiner that it had an "overall" hydraulic diameter of 0.0496 inch. Showa Ex. 4 at 167.

Three Modine witnesses, Leon Guntly (one of the inventors named in the '580 patent), Philip Saperstein (a Modine executive and an inventor named in the '311 patent) and William VanSanten (the attorney who

prosecuted the patent), testified that Modine surrendered the range of hydraulic diameters between 0.040 and 0.070 inch to avoid the prior art. Showa Phys. Ex. A at 594-95; Showa Phys. Ex. A at 594-95; Showa Phys. Ex. B at 66-67; Showa Phys. Ex. C at 200-201.

But the examiner still rejected all of Modine's claims, stating that they were obvious in light of the Caterpillar condenser and other prior art, and that the difference between the claimed invention's largest possible hydraulic diameter of 0.040 inch and the Cat condenser's overall hydraulic diameter of 0.049 inch was "an obvious matter of design choice." Showa Ex. 4 at 185.

Modine then argued that the Cat condenser's individual flow paths that had hydraulic diameters smaller than 0.040 inch should not be considered as teaching or making obvious Modine's claimed invention because the bonding of the inserts in the Cat condenser was not complete. Modine also argued that the overall hydraulic diameter of the Cat condenser was so much larger than Modine's claimed upper limit of a hydraulic diameter of 0.040 inch that the hydraulic diameter of the Cat condenser should not affect the patentability of Modine's claimed range. *Id.* at 190-92. Finally, Modine argued that its invention was distinguishable over the Cat condenser because the upper limit of the range of hydraulic diameter claimed by Modine was "smaller than even the average hydraulic diameter of the passages in the prior art condenser...." *Id.* at 192.

The examiner again rejected all claims in this application, and Modine abandoned the Parent application. *Id.* at 193-196.

The Child Application: Modine filed the Child application on January 7, 1988. Eventually, ten claims were allowed.

Prosecution claims 1-10 and 15-21 recited a hydraulic diameter between about 0.015 and 0.040 inch. *Id.* at 257-264. Other claims included the small hydraulic diameter element, but in descriptive language without numbers. Claims 25-28 used the term "relatively small hydraulic diameter." *Id.* at 414-416.

The specification disclosure in the Child application (which became the specification for the '580 patent) referred to a hydraulic diameter in the range of 0.015 to 0.040 inch. *Id.* at 240, 246, 252; Showa Ex. 2 at col. 1, 11. 62-64; col. 4, 11. 46-50; col. 7, 11. 64-68. This range reflected hydraulic diameters smaller than the "overall" hydraulic diameter of the Cat condenser.

In the one place that the specification did not recite the 0.015 to 0.040 inch range, it referred to "a relatively small hydraulic diameter for the flow paths as mentioned previously." Showa Ex. 5 at 247; Showa Ex. 2 at col. 5, 11. 22-24. The only hydraulic diameter mentioned previously in the specification was the numerical range set forth a few paragraphs earlier. This stated:

> According to the invention, each of the flow paths ... have hydraulic diameters in the range of about 0.015 to 0.040 inches. Given current assembly techniques known in the art, a hydraulic diameter of approximately 0.025 inches optimizes ultimate heat transfer efficiency and ease of construction.

Showa Ex. 5 at 246; Showa Ex. 2 at col. 4, 11. 43-48.

On May 4, 1988, the examiner rejected all of the claims in light of the Cat condenser and other references. The examiner understood that Modine was claiming only hydraulic diameters of 0.015 to 0.040 inch:

> [T]he applicant discusses flow path hydraulic diameters to be 0.0382-0.0448 and 0.0496 for the known condenser.... [T]o particularly modify the flow paths of Yoko to operate effectively as a condenser by choosing a hydraulic diameter between 0.015 and 0.040 inches would have been obvious to one of ordinary skill in view of the known range of 0.038 to 0.0448 discussed by applicant's [disclosure of the flow paths in the Cat condenser] (*i.e.*, 0.04 falling within these known values for condenser flow paths).

Showa Ex. 5 at 288.

On October 6, 1988, Modine filed an amendment. *Id.* at 358-366. Modine did not suggest that any of its claims covered subject matter outside the range of 0.015-0.040 inch; instead, Modine argued that the relevant hydraulic diameter in the Cat condenser was not its individual flow paths with hydraulic diameters less than 0.040 inch, but its 0.049 inch "overall" hydraulic diameter. This was larger than the largest hydraulic diameter that Modine claimed. Modine made no distinction between its claims containing a numerical range and its claims describing a small hydraulic diameter in words. Modine represented that none

of its claims covered hydraulic diameters larger than 0.040 inch:

> ... the fact that a Cat Folded Front condenser may have had one or more passages with hydraulic diameters of less than 0.040 [inches] is not dispositive since the overall hydraulic diameter was 0.049 inches.... [S]ince the overall hydraulic diameter [of the Cat condenser] is 25% above the top end of the range claimed [by Modine], that should be the one that is accorded anticipatory effect if any, particularly since improved results with the PF condenser are demonstrated at hydraulic diameters of 0.035 inches and 0.039 inches (the latter being almost right at the top end of the claimed range) over the Cat Folded Front having an overall hydraulic diameter of 0.049 inches.

Id. at 363-364.

The examiner again rejected all claims, indicating that the claimed hydraulic diameter was taught by the Cat condenser because the claimed range of 0.015 to 0.040 inch was not patentably distinguishable over the 0.049 inch *overall* hydraulic diameter of the Cat condenser. *Id.* at 397-403.

On July 17, 1989, Modine added prosecution claims 25-28. Prosecution claims 25, 27 and 28, after revisions, became claims 9 and 10 of the '580 patent. Claim 25 recited a "relatively small hydraulic diameter." The examiner pointed out that the "relatively small" hydraulic

diameter element was no larger than 0.040 inch. He noted that prosecution "claim[s] ... 19-25," which included the "relatively small" hydraulic diameter element, were unpatentable because to modify "the flow paths of Yoko to operate effectively as [a] condenser by choosing a hydraulic diameter between 0.015 and 0.040 inch would have been obvious to one of ordinary skill" and because "it would have been obvious to one of ordinary skill in the art of heat exchange to reduce a hydraulic diameter of a flow path to within the claimed range of 0.015 to 0.04." *Id.* at 454-455, 458. The examiner never suggested that "relatively small" meant anything other than 0.015 to 0.040.

Modine told the examiner that claim 25 was broader than original claim 10 in some respects and narrower in others. Showa Ex. 5 at 416. Modine stated that claim 25 was directed to the improved strength characteristic of the invention, while claims 27 and 28 were directed to the crevice feature. One difference between claim 25 and original claim 10 was related to strength: the "undulating insert" in claim 10 was broadened to "web means ... joined to the flat side walls" in claim 25. Claim 25 was broader than original claim 10 in other ways as well; for example, claim 25 was not limited to condensers using the refrigerant R-12. *Id.* 414-428.

Claim 27, which depended from claim 25 but added a crevice element, became patent claim 9. Claim 28, which became claim 10, depended from claim 25 and added only the limitation of a plurality of crevices.

In the July 17, 1989 amendment Modine for the first time pointed out that the microcracks recited in many of its

claims offered unexpected heat transfer advantages. *Id.* at 426. Until that time the examiner consistently had rejected the range of 0.015 to 0.040 inch as obvious in light of the size of the hydraulic diameter of the Cat condenser, even though the Cat's hydraulic diameter was above the range claimed by Modine. When Modine made the microcracks argument, the examiner for the first time allowed some of the claims. He rejected all of Modine's arguments except this one:

> Applicant's arguments concerning the flux coating o[n] the interior of the passages, in light of the Japanese document and translation filed in paper no. 12, these arguments have been found to be persuasive. *Therefore*, claims 16, 17, 18[,] 20-24[,] 27 and 28, are believed to contain allowable subject matter.

Id. at 457-458 (emphasis added).

Prosecution claim 27 became claim 9 and prosecution claim 28 became claim 10. These claims were allowed even though they did not contain a microcracks limitation. They were limited to a small hydraulic diameter, as was every other claim that was allowed. But the other claims were only allowed when they included a microcracks limitation. Claims 27 and 28 were allowed although they do not expressly claim microcracks, and the examiner never said that he had changed his mind about the obviousness of Modine's range of 0.015 to 0.040 inch. Yet Modine's arguments persuaded the examiner only after

the microcracks argument was made. The word "therefore" in the last sentence quoted above indicates that the examiner thought he was allowing claims 27 and 28 because of the microcracks argument. The examiner offered no explanation as to why two claims that did not have a microcracks limitation were allowed.

Although claims 9 and 10 included a crevices limitation, the examiner had previously rejected a combination of small hydraulic diameter and crevices. In the same office action that allowed the claims that became claims 9 and 10, the examiner rejected prosecution claims 25 and 26. Prosecution claim 27 (which became patent claim 9) was allowed. It recited the condenser of claim 25 (found to be obvious) plus a crevice element. Prosecution claim 26, which was rejected, recited the condenser of claim 25 (found to be obvious) plus an undulating spacer. Claim 26 was found to be obvious by the examiner although it recited an undulating spacer and such a spacer had crevices. The examiner did not explain why he allowed claim 27 while rejecting claim 26. The undulating spacer depicted in Figure 2 showed crevices, and the patent specification expressly described the undulating spacer as including crevices. Showa Ex. 2 at Col. 5, 11. 28-31. The action of the examiner appears to be inconsistent, and may be due to the limited amount of time that an examiner has to review patent applications.

In rejecting prosecution claims 25 and 26, the examiner stated that he was relying on two Japanese patents, No. 58-221390 to Oohara and No. 57-198922 to Yoko, and on the Cat condenser. Child App., Showa Ex. 5, at 454-59. The only difference between claim 25, which the examiner

rejected, and prosecution claim 27 which was allowed as patent claim 9, was the presence of the crevice element. Yoko and Oohara disclosed tubes with undulating bonded inserts that had crevices. In addition, Mr. Saperstein testified that the tube and spacer construction depicted as prior art in Fig. 3 of Modine's 740,000 application disclosed crevices. Saperstein Tr. 171-72.

These prior art references did not discuss the surface tension functions associated with crevices in the patent specification or point out the advantages of crevices. (The Uehara patent, that was not before the examiner, did. *See* p. 45 above.) In any event, the '580 patent covers a structure, not a process. "Mere recognition of latent properties in the prior art does not render nonobvious an otherwise known invention." *In re Baxter Travenol Labs*, 952 F.2d 388, 392, 21 U.S.P.Q.2d 1281, 1285 (Fed. Cir. 1991). Even if the inventors named in the '580 patent had discovered and claimed a new benefit of an old process, neither the new benefit nor the old process would be patentable. *In re Woodruff*, 919 F.2d 1575, 1578, 16 U.S.P.Q.2d 1934, 1936 (Fed. Cir. 1990).

Examination of the prosecution history suggests that the allowance of claims 27 and 28 (which became claims 9 and 10) may have been an oversight on the part of the examiner. If the examiner intended to allow claims 27 and 28 without the microcracks limitation, there is no way to determine which of his prior conclusions about the obviousness of the elements in claims 27 and 28 he had given up. Yet claims 9 and 10 were allowed and are presumed to be valid.

The wording of the other claims:

The Federal Circuit held in *Tandon Corp. v. U.S.I.T.C.*, 831 F.2d 1017, 1023, 4 U.S.P.Q.2d 1283, 1288 (Fed. Cir. 1987), that there is no presumption of "element differentiation." Two different elements in different claims can mean the same thing. Because of the assertions of the applicant in the prosecution history and the statements made by the examiner, the phrase "relatively small hydraulic diameter" in claims 9 and 10 is construed as covering only the range of 0.015 to 0.040 inch, the same range that is expressly set forth in other claims.

The doctrine of claim differentiation does not support a finding that "relatively small hydraulic diameter" must mean something other than the numerical range claimed in the prosecution history and disclosed in the patent specification because there are other distinctions between claims 9 and 10 and the other claims. *See Hormone Research Foundation, Inc. v. Genentech, Inc.*, 904 F.2d 1558, 1567 n. 15, 15 U.S.P.Q.2d 1039, 1047 n. 15 (Fed. Cir. 1990), *cert. dism'd*, 111 S. Ct. 1434 (1991).

Ordinarily, a claim that did not name a specific numerical range, and used a term such as "relatively small," could be construed as claiming a broader range than a claim where a specific numerical range is given. But in this case it would be unfair to the public to construe the more flexible language in claim 9 as covering condenser tubes with flow paths having larger hydraulic diameters than 0.040 inch when the applicant had assured the examiner (and the public) in the prosecution history that his claims were limited to tubes with flow paths having

hydraulic diameters in the range of 0.015-0.040 inch and that the upper limit of 0.040 was critical.

It would make no sense to construe one claim as including "the precise subject matter that was relinquished in order to obtain allowance" of another claim. *See Builders Concrete, Inc. v. Bremerton Concrete Products Co.*, 757 F.2d 255, 260, 225 U.S.P.Q. 240, 243 (Fed. Cir. 1985).

When the examiner rejected claims based on the size of the hydraulic diameter, he stated that the difference between Modine's claimed upper limit of 0.040 inch and the hydraulic diameter of the Cat condenser was too insignificant to support patentability. *See* Showa Ex. 5 at 399-400, 455. He wrote that to "modify the flow paths of Yoko to operate effectively as [a] condenser by choosing a hydraulic diameter between 0.015 and 0.040 inch would have been obvious." *Id.* at 455, 458. He never distinguished Modine's non-numerical hydraulic diameter claims from its numerical ones. Based on the wording of the other claims and the examiner's comments on them, claims 9 and 10 should be limited to a hydraulic diameter in the range of 0.015 tc 0.040.

The patent specification: The patent specification supports the same construction of the phrase "relatively small hydraulic diameter." Both the examiner and the public were entitled to rely upon the assurances of the applicant that the scope of the claims that Modine sought to have allowed over the prior art Cat condenser would be limited to a specific range. *See Texas Instruments Inc. v. U.S.I.T.C.*, 988 F.2d 1165 (Fed. Cir. 1993).

The patent specification initially was part of the prosecution history. It states that "[a]ccording to the invention, each of the flow paths ... have hydraulic diameters in the range of about 0.015 to 0.040 inches," and identifies 0.025 inch as the "optim[al]" hydraulic diameter. Showa Ex. 2, col. 4, 11. 42-50. Three of the next four paragraphs refer to that numerical range. Col. 4, 1. 55, Col. 4, 1. 59, Col. 5, 11. 13-14. The next paragraph refers to "the utilization of a relatively small hydraulic diameter for the flow paths as mentioned previously." Col. 5, 11. 22-24. The only hydraulic diameter "mentioned previously" in the specification is the range of 0.015 to 0.040 inch with an optimal size of 0.025 inch. Mr. VanSanten testified that the words "relatively small hydraulic diameter ... as mentioned previously" in the specification referred to that numerical range. Showa Phys. Ex. B at 148-150.

Modine argues that the upper limit of the range "mentioned previously" should be the 0.070 inch found in the '311 patent. The application for the '311 patent was filed while the Grandparent application of the '580 patent was pending. (The Grandparent application claimed a range with an upper limit of 0.070, but this was abandoned in the Parent and the Child applications.) The '311 patent incorporates by reference the Grandparent application with its 0.070 upper limit, and the '311 patent still was incorporated by reference into the '580 patent when it was issued. Showa Ex. 4 at 119. The '311 patent still refers to hydraulic diameters up to 0.070 inch, while the '580 patent does not. Showa Ex. A-44, col. 4, 11. 33-39.

The '311 patent was incorporated by reference into the '580 patent because it taught a method of tube and spacer construction, not because of its hydraulic diameter range. Showa Phys. Ex. A-44, col. 2, 11. 38-43. The '311 patent discloses "[a] highly preferred means by which the tubes 20 with accompanying spacers 40 may be formed." Showa Ex. 2, col. 4, 11. 35-41. A statement in another patent that is incorporated by reference to teach tube and spacer construction cannot be used to construe the hydraulic diameter range for the ' 580 patent, especially when the range in the '311 patent is inconsistent with the plain language in the specification and prosecution history of the '580 patent. The '311 patent was incorporated by reference only to show a method of bonding inserts to tubes as internal supports to solve fabrication problems in tubes with small flow paths. Showa Phys. Ex. A at 601-02. The hydraulic diameter limitation was incidental to the invention disclosed in the '311 patent. Four claims of that patent contain no hydraulic diameter limitation at all. Showa Phys. Ex. A-44 at col. 10. If Modine had wanted to claim a range of 0.015 to 0.070 in the '580 patent, it could have done so, while stating that the best mode was up to 0.040 inch. The hydraulic diameter range was an essential part of the '580 patent. Its meaning would not have been left for clarification by a patent that was only incorporated by reference. Modine did not want to claim the larger range because it wanted to have its claims allowed over the prior art Cat condenser.

Professor Marto, an expert witness in this case, testified that a person who wanted to understand the '580 patent would have read the '311 patent because it was

incorporated by reference into the '580 patent, but he himself had not read the Wallace patent, the Kawase patent or the 740,000 application that were incorporated by reference in the '580 patent. Marto Tr. 879-80.

It is not reasonable to assume that a person of ordinary skill in the art would have determined the meaning of "relatively small hydraulic diameter" in claim 9 by studying the '311 patent rather than the '580 patent itself.

Modine also argues that its intent to claim hydraulic diameters up to 0.070 inch in claim 9 was disclosed in Figure 5. This position is inconsistent with Modine's own statements to the examiner and in the written specification. The specification describes Figure 5 as showing that: "heat transfer is advantageously and substantially increased in the range of hydraulic diameters of about 0.015 inch to about 0.040 inch through the use of *the invention*." (Emphasis added.) Showa Ex. 5 at 252; Showa Ex. 2 at col. 7, 11. 64-67. There is no suggestion that heat transfer would be advantageously increased outside the disclosed range. In distinguishing the Cat condenser from the '580 invention, Modine argued that "improved results with the PF condenser are demonstrated at hydraulic diameters of 0.035 inch and 0.039 inch (the latter being almost right at the top end of the claimed range) over the Cat Folded Front [condenser] having an overall hydraulic diameter of 0.049 inches." Showa Ex. 5 at 364. Nothing in Figure 5 teaches the reader that Modine was disclosing an upper limit of 0.070 inch. Modine now says that it was merely identifying the preferred embodiment of its invention when it referred to the 0.015 to 0.040 inch range, but it never taught the reader of the patent any other range. This is

inconsistent with the written description of Figure 5 in the specification. Showa Ex. 2 at col. 7, lines 65-67. The same numerical range appears in the "Summary of the Invention" (Showa Ex. 2 at col. 1, lines 63-64), and it appears in a description of the applicable range "[a]ccording to the invention." *Id.* at col. 4, 11, 42-47. The number 0.070 is never mentioned.

In the Parent application Modine had described the 0.015 to 0.040 inch range shown in the drawing that became Figure 5 of the patent as the "peak area that is sought to be covered by the applicant." Showa Ex. 4 at 161. Modine expressly narrowed its claims to this numerical range to get its claims allowed.

To summarize, in Grandparent application the applicant claimed a hydraulic diameter range of 0.015 to 0.070. This range was rejected because numbers in this range were found in the prior art. After the Grandparent application was abandoned, the applicant consistently took the position that it was claiming a condenser with flow paths having a hydraulic diameter in the range of 0.015 to 0.040 inch, and was not claiming any condenser with a flow path that had a hydraulic diameter with an overall average above 0.040 inch. Subject matter relating to condenser tubes with flow paths having a hydraulic diameter larger than that were abandoned by the applicant to distinguish his invention from the prior art and to obtain allowance of his claims. The prosecution history limits the interpretation of claims to exclude any interpretation that may have been disclaimed or disavowed during prosecution in order to obtain claim allowance. *Jonsson v. Stanley Works*, 903 F.2d at 818, 14 U.S.P.Q.2d at 1869. *Standard*

Oil Co. v. American Cyanamid Co., 774 F.2d 448, 452, 227 U.S.P.Q. 293, 296 (Fed. Cir. 1985). The meaning of "relatively small hydraulic diameter" in claims 9 and 10 therefore must be limited to the numerical range of 0.015 to 0.040 inch.

* * *

SECTION 112(2)

Patent claims are indefinite unless they "particularly point[ ] out and distinctly claim[ ] the subject matter which the applicant regards as his invention." 35 U.S.C. § 112(2). "When the meaning of claims is in doubt, especially when, as is the case here, there is close prior art, they are properly declared invalid." *Amgen, Inc. v. Chugai Pharmaceutical Co.*, Ltd., 927 F.2d 1200, 1218, 18 U.S.P.Q.2d 1016, 1031 (Fed. Cir.), *cert. denied*, 112 S. Ct. 169 (1991).

The phrase "relatively small hydraulic diameter" is not so indefinite as to make claims 9 and 10 invalid under Section 112(2). The phrase is so clearly defined by the applicant in the prosecution history and in the patent specification and limited to the range 0.015 to 0.040 that it would be difficult for anyone to find that the phrase was indefinite when read in the context of the patent specification or the prosecution history.

Although Modine witnesses offered a broad range of interpretations of the meaning of "relatively small" (*see, for example*, Marto Tr. 861, 864, 866, 711-712, VanSanten dep., Showa Phys. Ex. B at 83-83, 198-99), the

prosecution history and the patent itself are available to anyone who wants to understand this phrase. The public should be able to rely on what the patentee said in these documents when the patentee himself interpreted an ambiguous phrase. The patentee should not be able to change his interpretation of an ambiguous term after the patent claims are allowed. If the various interpretations suggested in this record by Modine witnesses were used, it would be impossible to arrive at a single clear definition of the phrase "relatively small," and the claims in which this phrase appeared would be invalid as indefinite under Section 112(2).

Another problem under Section 112(2) is raised by the specification of the '580 patent. It suggests that the range of hydraulic diameters recited in the patent refers only to condensers using the refrigerant R-12, while "[s]omewhat different values might be expected in systems using different refrigerants." Showa Ex. 2, col. 4, 11. 55-58. If the meaning of the phrase "relatively small" depended on the type of refrigerant used, a manufacturer might build a condenser that is non-infringing so long as the system uses R-12, but becomes infringing when the system uses a different refrigerant. *See* Marto Tr. 866, VanSanten dep., Showa Phys. Ex. B. at 83-84. There would be no way for someone trying to design around the patent to be sure that a flow path with a hydraulic diameter in a particular range would not infringe the patent. Because of restrictions on chlorofluorocarbons, production of R-12 will cease at the end of 1995 (Saperstein Tr. 156-158), and all condensers built during the remaining 13 years before the '580 patent expires will have to use other refrigerants. If the meaning

of "relatively small hydraulic diameter" changes in some unknown and unpredictable way when a new refrigerant is used, claims 9 and 10 would be invalid as indefinite under Section 112(2). Moreover, when the patentee expressly limited his claims to cover only the size of hydraulic diameters in a specific range in order to get his claims allowed, the patentee should not be able to enlarge his claim beyond this range after the claim is allowed so that the claim can cover refrigerants that are not now known. *See Mathis v. Hydro Air Industries, Inc.*, 1 U.S.P.Q.2d 1513, 1517 (C.D. Cal. 1986), *aff'd without op.*, 818 F.2d 874 (Fed. Cir.), *cert. denied*, 484 U.S. 826 (1987).

Claims 9 and 10 have been construed herein as covering a specific range of hydraulic diameters regardless of the type of refrigerant that is used. As so construed, the phrase "relatively small hydraulic diameter" does not make the claims invalid for indefiniteness under Section 112(2).

* * *

THE SCOPE AND CONTENT OF THE PRIOR ART

All the prior art relied upon in this section was in existence before October 2, 1985, the date of filing of the Grandparent application. This prior art includes references cited by the examiner and some that were not before the examiner.

The Cat Condenser: The prosecution history of the '580 patent discusses the most relevant prior art, the Caterpillar or Cat condenser. In 1979, Modine built the Cat condenser. Modine had been selling the Cat condenser for

several years before it sought a patent for the PF condenser. The Cat condenser is a parallel flow condenser, containing parallel tubes arranged between headers. Tr. 228. Each tube contained a sinusoidal or corrugated insert partially brazed to the interior tube wall. Tr. 229. The insert created crevices. Tr. 429. The insert increased surface area for heat transfer and reduced the hydraulic diameter of the tube. A smaller hydraulic diameter tends to increase the resistance to fluid flow inside the tube, or cause "increased pressure drop" on the refrigerant side. Mr. Guntly removed four baffles in the headers to increase the free flow area (the area available for the refrigerant to flow through), and this limited the refrigerant-side pressure drop. Showa Phys. Ex. A at 215-16; Showa Phys. Ex. A-17.

The Cat condenser was made of steel and it had plate air fins. Air fins are fins on the outside of a condenser tube. Saperstein Tr. 167. The Cat condenser was designed to be used as a module along with the heavy-duty steel radiators and oil coolers already being used in Caterpillar earth-moving equipment. *See* Child application, Showa Ex. 5 at 520. Steel, which is not a good heat conductor, had to be used to meet the needs of the Caterpillar as earth-moving equipment. Saperstein Tr. 228, dep. at Showa Phys. Ex. C, pp. 43-44, 47-48. Plate fins had to be used on the outside (or air side) of the tubes so that the condenser would fit into the existing Caterpillar equipment. They offered no heat transfer advantages and they caused a problem: After the tubes had been inserted into the holes in the plate fins where they were supposed to be aligned, the tubes had to be *widened* by a steel expansion device to

ensure good contact with the plate fins. When Mr. Guntly put an insert inside the condenser tubes, he could not press the tubes down to obtain good bonding between the insert and the tubes. If he had done so, the tubes would have lost contact with the outside plate fins. Saperstein dep., Showa Phys. Ex. C at 69-70. Complete bonding would have increased heat transfer, but this could not be achieved because of the plate air fins. Showa Phys. Ex. A-17 at M021543; Parent App., Showa Ex. 4 at 190-91.

Modine told the examiner in the Child application that the Cat condenser tube had an "overall" hydraulic diameter of 0.04822 inch, (changed from Modine's earlier overall measurement of 0.0496) and urged the examiner to use this number as the hydraulic diameter of the Cat, rather than measurements of individual sections of the Cat tube. The Modine measurement for the overall hydraulic diameter of the Cat was 0.008 inch above the upper limit of the hydraulic diameter range of claims 9 and 10 (0.040 inch) as construed herein.

* * *

Meanwhile, Showa was developing its own techniques to make a smaller lighter condenser with tubes having a small hydraulic diameter.

A contemporaneous independent invention shows that at least two people have been trying to solve the same problem, and that they succeeded at about the same time. The very fact that two companies develop a different solution to the same problem, as they did here, at about the

same time suggests that there was no need that others were unable to meet at that particular time.

The Federal Circuit has held that contemporaneous independent invention is an indication of the level of knowledge in the art at the time the invention was made, and supports a finding of obviousness. *In re Merck & Co., Inc.*, 800 F.2d 1091, 1098, 231 U.S.P.Q. 375, 380 (Fed. Cir. 1986).

Showa developed its SC condenser at about the same time that Modine developed its PF condenser. Both companies developed condensers that were smaller and lighter than their serpentine condensers, yet could be made at a reasonable cost. In the late 1960's Showa manufactured serpentine condensers that had extruded flat tubes with inner fins and interior partitions that created discrete flow paths. Okamoto Tr. 1031-1032; Showa Ex. 41. The partitions and inner fins increased the heat transfer area inside the tubes. Okamoto Tr. 1057-58. The partitions also strengthened the condenser tube so that it could withstand internal pressure from the hot refrigerant. Tr. 1057. In the 1970's and early 1980's, Showa made condenser tubes with various types of internal fins, including saw-toothed fins, to increase the interior surface area. Tr. 1058; Modine Phys. Ex. C-4 at SH10000430-429 (Japanese Design Announcements, laid open in 1981); Modine Phys. Ex. C-4 at SH10000428-427; Modine Phys. Ex. C-6; Showa Ex. 36.

In 1972, Showa manufactured a vertical parallel flow condenser for Hitachi Limited. Okamoto Tr. 1061-62; Suzuki dep., Modine Phys. Ex. J at 96-98. This condenser, the subject of 1972 Japanese patent 49-114145,

Showa Phys. Ex. J, Tab 1, had headers connected by multiple parallel extruded tubes, through which the refrigerant flowed from top to bottom. Okamoto Tr. 1061-1062. Each tube had a single triangular internal "tooth" at the top and bottom of its flow path. Showa Ex. 60; Okamoto dep., Modine Phys. Ex. G at 4-5. Due to the high cost of these tubes and difficulty in bonding the tubes to headers, Showa stopped making this condenser after about a year. Suzuki dep., Modine Phys. Ex. J at 68; Okamoto dep., Modine Phys. Ex. G at 9-11.

In 1980, Showa began to develop a new parallel flow condenser. Okamoto Tr. 1063-64. Showa built and tested several parallel flow condensers in the early 1980's. Modine Phys. Ex. C-5; Showa Ex. 42; Okamoto Tr. 1065; Modine Phys. Ex. C-19 at SH10000562, 566; Sasaki dep., Modine Phys. Ex. H at 68-71; Suzuki dep., Modine Phys. Ex. J at 57-73, 74-75, 99-100; Hoshino dep., Modine Phys. Ex. C at 67-74, 93-94. After these tests, Showa designed a smaller and lighter condenser. Okamoto Tr. 1065; Showa Ex. 54. The new condenser contained parallel tubes between headers. It had the same core frontal area as the serpentine condenser but half the thickness of the condenser core. Showa expected the thinning of the core to result in a loss of heat transfer. To compensate for this, Showa reduced the pitch (distance between corners) and height of the air fins. Reducing the pitch and height of the air fins would increase air-side pressure drop. To compensate for this, Showa reduced the thickness of the air-side fins and made the tube smaller. Okamoto Tr. 1066; Hoshino dep., Modine Phys. Ex. C at 175; Modine Phys. Ex. C-19 at SH10000583. To

compensate for the decrease in surface area inside the tube because of the smaller tube size, Showa added saw-toothed fins around the inside wall of the tube and partitions. Okamoto Tr. 1067; Modine Phys. Ex. C-19 at SH10000583. Showa also added to the number of circuits in the condenser to limit refrigerant-side pressure drop. Okamoto Tr. 1067; Hoshino dep., Modine Phys. Ex. C at 175. By February 1986, Showa had completed the design of its new condenser, called the SC or super compact condenser. Modine Phys. Ex. C-19 at SH10000581. By June 10, 1986, Showa had tested a prototype. Okamoto Tr. 1069, 1070-71; Modine Phys. Ex. G-3. The prototype used flat, rectangular extruded tubes with three flow paths with saw-toothed inner fins on the interior walls. Okamoto Tr. 1072; Modine Phys. Ex. C-19 at SH10000583. The heat transfer performance of the new condenser was comparable to that of the serpentine condenser, but the new condenser had lower refrigerant-side pressure drop and 38% less weight. Modine Phys. Ex. G-3. Later, the tubes were made smaller and changed in shape from rectangular to rounded at the corners that were exposed to air to reduce air-side pressure drop. Okamoto Tr. 1077; Hoshino dep., Modine Phys. Ex. C at 221-222; Showa Ex. 45. Initially Showa had difficulty obtaining a tube-to-header bond that did not leak, and it had a problem extruding a tube with a small height that had sawteeth around the entire perimeter. Okamoto Tr. 1072-75. Showa solved the bonding problem by [confidential business information deleted]. By September of 1987, Showa itself was able to extrude the tubes at less cost using conventional extrusion methods. Tr. 1079. Showa began to market the SC condenser in

July, 1986. Modine Phys. Ex. C-14 at SH10000618-608. In September 1986, Showa brought a sample of its new condenser to Modine and proposed a joint manufacturing venture. Okamoto Tr. 1080-82; Showa Ex. 39 at SH10000818-820 (pp. 12-14 of translation). Modine declined the offer, saying it was developing a similar product. Showa Ex. 39 at SH10000818-820. Mr. Okamoto testified that Showa did not become aware of any of the features of Modine's PF condenser until February 1987, when Modine publicly introduced the condenser at a trade show. Okamoto Tr. 1082.

Showa argues that it independently designed its SC condenser. Modine offered no evidence to support its suggestion that Showa obtained information from Honda about Modine's condenser in January 1986, one month before Showa made its drawings for the SC condenser. Showa has offered testimony and produced documentary evidence of its progress in developing a parallel condenser before it saw Modine's designs. It is found that Showa independently developed its own SC condenser.

Showa's independent development of the SC condenser at about the same time that Modine developed its PF condenser lends support to a finding that claims 9 and 10 of the '580 patent were invalid for obviousness. *See Merck*, 800 F.2d at 1098, 231 U.S.P.Q. at 380; *In re Farrenkopf*, 713 F.2d 714, 719-20, 219 U.S.P.Q. 1, 6 (Fed. Cir. 1983); *Concrete Appliances Co. v. Gomery*, 269 U.S. 177, 185 (1925).

Long-felt need under the circumstances of this case does not support a finding of non-obviousness.

* * *

INFRINGEMENT

CONSTRUCTION OF CLAIMS 9 AND 10

Claims 9 and 10 were construed in connection with determining whether these claims were valid. *See* page 7 above. The claims must be construed in the same way for the purposes of validity and infringement.

LITERAL INFRINGEMENT

Modine's complaint identified two condenser models made by Showa that it accused of infringing the '580 patent. At the hearing, Modine asserted that seven additional condenser models made by Showa were infringing. *See* Modine Ex. 48. All nine models were purchased by Modine in the United States. They include condensers made for the 1992 Mitsubishi Demand, the 1992 Mitsubishi 3000GT, the Mazda 929, the 1992 Honda Civic, the 1993 Audi, the 1993 Mercedes Benz, and the 1993 Mitsubishi Mirage. Modine made more than one measurement of more than one tube from each condenser. Modine reported a hydraulic diameter range for each condenser tested. The ranges were: 0.0484-0.0519; 0.0453-0.0520; 0.0577-0.0477; 0.0577- 0.0606; 0.0482-0.0497; 0.061-0.065; 0.0445-0.0682; 0.0424-0.0573; and 0.0513-0.0547.

The accused Showa condensers have two different types of tubes.

1. The first type of tube is 3mm high (with a 16mm width) and is found in most of Showa's condenser models, including the Mitsubishi GT 3000 and Diamante. The interior perimeter of all the 3mm tubes contains saw-toothed inner fins.

2. A small number of condenser models, including some for the Mitsubishi Mirage (included in Modine's accused condensers), use a second type of tube that has a height of 2mm (and a 20mm width). The 2mm tube does not contain those saw-toothed inner fins, but its hydraulic diameter is similar to the hydraulic diameter of Showa's 3mm tube, even though its free flow area is much smaller, because its wetted perimeter is much smaller without the sawteeth. *See* Modine Phys. Ex. III at 11-29.

* * *

The hydraulic diameters of the accused condensers: The accused Showa condensers, regardless of whether they had sawteeth, were measured by Modine, and none had a hydraulic diameter smaller than 0.040 inch, the upper limit covered by claims 9 and 10. As a result, Showa's accused condensers do not literally infringe claims 9 and 10.

The hydraulic diameter of flow paths will vary within a single condenser. Modine's Responses to Staff's Second Set of Interrogatories, Showa Phys. Ex. O, Response to Interrogatory No. 27. Modine Ex. 48 shows that Modine measured the hydraulic diameter of more than one cross-sectioned tube for each condenser. Those measurements varied in the same condenser. For example, the hydraulic diameters for the single Audi condenser on

page 5 ranged from .0682 inch (Mount Number 3500-9) to .0445 inch (Mount Number 3500-14). The hydraulic diameter of a single flow path at a single point within a condenser cannot be characterized as the hydraulic diameter of the flow paths of that condenser. Because of these variations in the sizes of the hydraulic diameters, the average of the hydraulic diameter measurements of flow paths in the tubes at different points in the condenser will be used as the overall hydraulic diameter. Modine itself urged the examiner in the '580 patent prosecution to use only the overall or average hydraulic diameter of the Cat condenser (0.04822), instead of the variable hydraulic diameters of individual flow paths, for the same reason. Showa Ex. 4 at 192; Showa Ex. 5 at 364.

At the hearing Modine selected the smallest available individual sample measurements as the hydraulic diameter, rather than using the average hydraulic diameter. Modine measured more than three samples for all of the other condensers listed on its exhibit. Based on Modine's measurements in Modine Ex. 48, however, no Showa condenser had a hydraulic diameter below the upper limit of the patent claims, 0.040, and the hydraulic diameters found in only one Showa condenser fell below the overall hydraulic diameter of the Cat condenser (0.04822). This condenser was the one from the 1992 Mazda 929 that Modine purchased in October, 1991. According to Modine, it had a hydraulic diameter range of 0.0453-0.0477. While five measurements were given for that condenser, the measurements listed in Ex. 48 came from only three samples taken from the condenser. Mount Numbers MZ14 and MZ23 were measured twice, and different numbers were

obtained in each measurement. The mount numbers for the samples of the Mazda condenser indicate that as many as 23 samples were taken from that condenser, but only three were selected for Modine Exhibit 48. Modine did not explain why these three samples were selected or whether they could be considered representative of the ones measured but not reported. The hydraulic diameter measurements of the three samples selected from this condenser are substantially smaller than the measurements of samples from two other versions of the same model condenser. Nevertheless, there is nothing in the record to show that respondents moved to compel the production of either the 23 samples or the measurements made by Modine on all 23 samples from this condenser. Modine Ex. 48 was received in evidence without objection by respondents.

In short, respondents argue that Modine's evidence about this Showa condenser is not worth believing, but they made no serious effort to prove that the condenser in fact had a higher average hydraulic diameter. On the other hand, the only evidence that Modine has offered of an SC condenser with any hydraulic diameter less than the average hydraulic diameter of the Cat is based on a limited number of samples selected by Modine from a much larger number of samples removed from a single condenser. The only evidence in the record on the hydraulic diameter range found by Modine in the Mazda condenser is not entitled to much weight. The hydraulic diameters listed by Modine in Modine Ex. 48 is, however, the only evidence relating to the hydraulic diameter of that particular condenser in the record. Both the upper limit and the lower limit of the hydraulic diameter range for this condenser are below the overall hydraulic

diameter of the Cat condenser (0.04822) but above the upper limit of the hydraulic diameter range of claims 9 and 10 (0.040), so that the condenser does not literally infringe these claims. None of the other accused condensers literally infringes claims 9 or 10 of the patent.

INFRINGEMENT UNDER THE
DOCTRINE OF EQUIVALENTS

Modine contended that if it is entitled to a range of equivalents up to the 0.04822 inch overall hydraulic diameter of the Cat condenser, Showa could be found to have infringed claims 9 and 10 based on a small number of individual flow path measurements made by Modine that indicated hydraulic diameters below this size in flow paths of Showa's condenser tubes. It is not clear whether Modine's numbers took into account variations in measurements that showed larger hydraulic diameters than those selected here.

Regardless of Modine's method of selecting the measurements that would be used to establish a range of hydraulic diameters for the Mazda condenser, Modine is not entitled to a range of equivalents beyond the 0.040 inch literal scope of claims 9 and 10 for the reasons stated earlier under claim construction. Even if a wider range of hydraulic diameters were given to Modine under the doctrine of equivalents so that the element of claim 9 requiring a relatively small hydraulic diameter could be found in the accused Mazda condenser, that condenser may perform substantially the same function to obtain substantially the same result as the condenser of claims 9 and 10, but it does

not do this in substantially the same way as the condenser of claims 9 and 10.

The doctrine of equivalents is not always available to patentees. In *Pennwalt Corp. v. Durand-Wayland, Inc.*, 833 F.2d 931, 4 U.S.P.Q.2d 1737 (Fed. Cir. 1987), *cert. denied*, 485 U.S. 961, 1009 (1988), the Federal Circuit held that infringement under the doctrine of equivalents "may be found (but not necessarily) if an accused device performs substantially the same function or work, in substantially the same way, to obtain substantially the same overall results as the claimed invention." 833 F.2d at 934, 4 U.S.P.Q.2d at 1744 (citing *Graver Tank & Mfg. Co., Inc. v. Linde Air Products Co.*, 339 U.S. 605, 608, 85 U.S.P.Q. 328 (1950)).

The Federal Circuit has on occasion indicated that the doctrine of equivalents should not be applied unless there is a compelling reason to do so. For example, the Court in *London v. Carson Pirie Scott & Co.*, 946 F.2d 1534, 1538, 20 U.S.P.Q.2d 1456, 1458-59 (Fed. Cir. 1991) noted:

> Application of the doctrine of equivalents is the exception, ... not the rule, for if the public comes to believe (or fear) that ... the doctrine of equivalents is simply the second prong of every infringement charge, regularly available to extend protection beyond the scope of the claims, then claims will cease to serve their intended purpose. Competitors will never know whether their actions infringe a granted patent.

The doctrine of equivalents should not be used to "erase a plethora of meaningful structural and functional limitations of the claim on which the public is entitled to rely in

avoiding infringement." *Malta v. Schulmerich Carillons, Inc.*, 952 F.2d 1320, 1327, 21 U.S.P.Q.2d 1161, 1166 (Fed. Cir. 1991), *cert. denied*, 112 S. Ct. 2942 (1992); *Valmont Industries, Inc. v. Reinke Manufacturing Co., Inc.*, 983 F.2d 1039, 25 U.S.P.Q.2d 1451, 1454 (Fed. Cir. 1993); *Charles Greiner & Co. v. Mari-Med Mfg. Inc.*, 962 F.2d 1031, 1035, 22 U.S.P.Q.2d 1526, 1529 (Fed. Cir. 1992).

The doctrine of equivalents is supposed to protect against "unscrupulous" copying. *See* London, 946 F.2d at 1538, 20 U.S.P.Q.2d at 1458-59. *Lear Siegler, Inc. v. Sealy Mattress Co. of Michigan, Inc.*, 873 F.2d 1422, 1425, 10 U.S.P.Q.2d 1767, 1770 (Fed. Cir. 1989); *Greiner*, 962 F.2d at 1036, 22 U.S.P.Q.2d at 1529; *Pennwalt*, 833 F.2d at 935, 4 U.S.P.Q.2d at 1739. In this case the evidence does not support a finding that Showa copied the condenser disclosed in the '580 patent.

The Federal Circuit has held that the doctrine of equivalents is designed "to protect inventors from ... unanticipated equivalents." *Kinzenbaw v. Deere & Co.*, 741 F.2d 383, 389, 222 U.S.P.Q. 929, 933 (Fed. Cir.), *cert. denied*, 470 U.S. 1004 (1984). In this case, the existence of hydraulic diameters larger than the 0.040 inch literal upper limit of Modine's claim was clearly anticipated in the Cat condenser. These anticipated equivalents were the reason for Modine narrowing its claim to avoid the hydraulic diameter of the Cat or any hydraulic diameter close enough to the hydraulic diameter of the Cat to be considered to be an obvious matter of design choice.

Moreover, Modine is not entitled to use the doctrine of equivalents to expand the range of hydraulic diameters

beyond the range to which Modine limited its claims in the prosecution history because any such expansion is barred by the doctrine of prosecution history estoppel.

Modine's narrowing arguments to distinguish its invention from the Cat condenser bar it from claiming hydraulic diameters larger than 0.040. In this particular situation there is no area of equivalents between the average hydraulic diameter of the Cat and the upper limit of claim 9 that the patentee can claim under the doctrine of equivalents. Prosecution history estoppel limits a patentee's reliance on the doctrine of equivalents by preventing the resurrection of subject matter surrendered for the purpose of avoiding a prior art rejection. *Townsend Engineering Co. v. HiTec Co., Ltd.*, 829 F.2d 1086, 1090, 4 U.S.P.Q.2d 1136, 1139 (Fed. Cir. 1987); *Loctite Corp. v. Ultraseal Ltd.*, 781 F.2d 861, 870-871, 228 U.S.P.Q. 90, 96 (Fed. Cir. 1985). The doctrine applies both to amendments to claims to overcome rejections based on prior art, and to arguments submitted to obtain the patent. *Townsend*, 829 F.2d at 1090, 4 U.S.P.Q.2d at 1139.

When a patentee, in order to get his claims allowed, tells an examiner that his claims do not cover certain subject matter and that his claims can be distinguished on that basis from the prior art, equity requires that an accused device that incorporates the surrendered subject matter not be held to infringe the patent. *See Exhibit Supply Co. v. Ace Patents Corp.*, 315 U.S. 126, 136, 52 U.S.P.Q. 275, (1942).

In this case, the range of the hydraulic diameter in the prosecution claims was limited in the Parent application for the first time after the proposed claims covering a broader range were rejected in the Grandparent application as being

obvious. Even if the patentee had not limited his claims to overcome a rejection, as he did here, as a matter of fairness the public should be able to rely upon the arguments made by the patentee to the examiner as to what his claims covered. The patentee should not be able to retract these arguments as to how his claims should be construed once the patent is obtained. The Federal Circuit stated:

> The file on [the] patent, to which the public had access, explicitly showed that in response to the examiner's rejection, [the patentee] had narrowed his claims to a planter in which "the radius of the wheel ... [is] less than the radius of the disc." [The patentee] offers no convincing reason why a competing manufacturer was not justified in assuming that if he built a planter in which the radius of the wheels was greater than that of the disc," he would not infringe the [ ] patent.

Kinzenbaw v. Deere & Co., 741 F.2d 383, 389, 222 U.S.P.Q. 929, 933 (Fed. Cir. 1984), *cert. denied*, 470 U.S. 1004 (1985).

Modine has attempted to limit the application of prosecution history estoppel in this case by asserting that the examiner would have allowed prosecution claim 27 at a hydraulic diameter larger than 0.040 inch. No one knows what the examiner would have allowed. The Supreme Court has held the patent applicant to a strict construction of his claims if the applicant surrendered another construction during the prosecution history. It did not matter whether the narrow construction was critical to the examiner in deciding

whether to allow the claim. It did not matter whether the examiner would have allowed a broader claim. As the Federal Circuit recently has stated,

> Unmistakable assertions made by the applicant to the Patent and Trademark Office (PTO) in support of patentability, whether or not required to secure allowance of the claim, also may operate to preclude the patentee from asserting equivalency between a limitation of the claim and a substituted structure or process step.

Texas Instruments v. U.S.I.T.C., --- F.2d ----, 1993 WL 63006, *8, 26 U.S.P.Q.2d 1018 (Fed. Cir. 1993).

The public is entitled to rely on narrowing arguments regardless of whether they were necessary for patentability. *Kinzenbaw*, 741 F.2d at 389, 222 U.S.P.Q. at 937; *Polaroid Corp. v. Eastman Kodak Co.*, 789 F.2d 1556, 1570, 229 U.S.P.Q. 561, 572 (Fed. Cir.), *cert. denied*, 479 U.S. 850 (1986). In *Mannesmann Demag Corp. v. Engineered Metal Products Co.*, 793 F.2d 1279, 1284-85, 230 U.S.P.Q. 45, 48 (Fed. Cir. 1986) the Federal Circuit rejected the patentee's argument that an applicant making a narrowing argument must be deemed to have "relinquished no more than was necessary to distinguish the references," and held that a patentee cannot recapture an interpretation that "falls squarely within the claim scope ... relinquished to overcome the cited references", regardless of whether the surrender was necessary.

The prosecution history has been considered "in context," as required by *Read Corp. v. Portec, Inc.*, 970 F.2d 816,

824, 23 U.S.P.Q.2d 1426, 1433 (Fed. Cir. 1992). In *Read*, the patentee distinguished a prior art reference by noting a long list of distinctions showing that its invention was not comparable. The patentee did not argue that any of those points of distinction was by itself a patentable advance. The Federal Circuit refused to create a separate estoppel for one distinction picked out of the long list. The court noted that the applicant never "argued for patentability over any prior art reference solely based upon [that distinction]." *Read*, 970 F.2d at 824, 23 U.S.P.Q.2d at 1433.

Here, the applicant did argue that his claims were allowable over the prior art reference (the Cat condenser) based solely on the applicant's use of the small hydraulic diameter. A small hydraulic diameter was an essential element of every prosecution claim, and the Cat condenser was the most significant prior art cited against the invention. Modine repeatedly argued to the examiner that there were differences in the hydraulic diameters it claimed and those of the Cat condenser, and that these differences made the proposed claims allowable after they had been rejected.

When the patentee voluntarily made a narrowing argument or amendment to get his claim allowed, he should be bound by what he told the PTO, regardless of whether he had to narrow his claim to avoid the prior art. In *Exhibit Supply Co.*, the Supreme Court noted that the applicant "recognized and emphasized the difference between the two phrases and proclaimed his abandonment of all that is embraced in that difference.... The difference which he thus disclaimed must be regarded as material, and since the amendment operates as a disclaimer of that difference it must be strictly construed against him." *Exhibit Supply Co.*

v. Ace Patents Corp., 315 U.S. 136, 52 U.S.P.Q. at 275, 279, 280.

The parties argue as to whether the doctrine set forth in *Exhibit Supply* has been oversimplified by respondents. Although the case is rather old, the holding was strong and clear. The Federal Circuit has made inroads on the ruling in this case by making distinctions between the facts of this case and the facts in new cases to save a broad claim where it appeared equitable to do so. The clear ruling in *Exhibit Supply*, however, was to protect the public against a new construction by the patentee of a claim after he had abandoned the claim in the prosecution history where all who wanted to understand the scope of the patent could read it and try to design around it. If one bends over backwards to say that a patent applicant did not really mean to say what he said and that it should not be held against him, the rights of the public to make products that are not covered by the patentee's monopoly are threatened. Frequently the public has no notice other than the prosecution history and the patent itself of what the patent claim means, and no voice in the case where the patent claim is construed.

Claims 9 and 10 have been construed as covering a hydraulic diameter range of 0.015 to 0.040 inch. In this case, the doctrine of equivalents cannot be used to extend this range because the applicant expressly gave up a broader range. Prosecution history estoppel limits an applicant who surrendered specific subject matter in order to obtain allowance of a claim from later asserting that the claim covers the abandoned subject matter under the doctrine of equivalents.

It is found that Modine surrendered any range of hydraulic diameter above 0.040, and that it did this for the purpose of avoiding the prior art Cat condenser. Modine understood that it could not claim hydraulic diameters right up to the 0.04822 inch hydraulic diameter of the Cat condenser without risking a finding that there was no patentable distinction between its claimed range and the Cat condenser's hydraulic diameter. To put some distance between its claim and the Cat condenser, Modine claimed hydraulic diameters only up to 0.040 inch, and surrendered any higher range. Modine pointed out that the Cat condenser's hydraulic diameter was "25% larger than the top end of the range claimed" by the invention. Modine decided to create this particular buffer zone between its invention and the Cat condenser to support its argument that its invention was nonobvious. Although there was already a small difference between the 0.040 of Modine's claim and the 0.04822 of the Cat, the applicant wanted to put a larger buffer between his claims and the prior art so that the examiner would see a patentable difference between the hydraulic diameter the applicant was claiming and the slightly larger hydraulic diameter of the Cat condenser. The doctrine of equivalents cannot be used to eliminate this buffer. The greater the distance that Modine could put between the 0.04822 inch hydraulic diameter of the Cat condenser, the better Modine's chances of allowance would be. If the claimed range got too close to the number of the Cat condenser, the applicant knew that the claim would be rejected as obvious to one with ordinary skill in the art as an obvious matter of design choice. In this case, this is what the examiner said anyway. But in trying to persuade the

examiner, the applicant decided to surrender any hydraulic diameter larger than 0.040 inch. Modine repeatedly admitted that it gave up the range of flow paths larger than 0.040 inch in hydraulic diameter for the purpose of avoiding the prior art Cat condenser. *See* Guntly dep., Showa Phys. Ex. A at 594-96; VanSanten dep., Showa Phys. Ex. B at 66-67; Saperstein Tr. 400-01. The fact that the examiner never allowed the claims on this basis alone does not permit the patentee to reclaim the buffer range later, at least without going back to the PTO to amend the claims.

Claims 9 and 10 were added after Modine already had given up the range above 0.040 inch. When Modine added claims 9 and 10, it did not suggest to the examiner that the term "relatively small hydraulic diameter" as used in prosecution claim 25 should cover a broader range, nor did it try to amend the specification, which expressly referred to a range between 0.015 and 0.040 inch. The applicant had stated that its "invention," not just specific claims or preferred embodiments, had flow paths no larger than 0.040 inch.

It is found that Modine intended the examiner to understand that claims 9 and 10 were limited to the 0.015 to 0.040 inch hydraulic diameter range, just as Modine's other claims were limited. And the examiner did have this understanding. He interpreted claims 9 and 10 as having an upper limit of 0.040 inch. In his rejection of prosecution claim 25 (which contained the "relatively small hydraulic diameter" element used in patent claim 9), he wrote that the hydraulic diameter was obvious in light of the small difference between the Cat condenser's hydraulic diameter

and "the claimed range of 0.015 to 0.040 [inch]." *Id.* at 454-55.

In *LaBounty*, the Federal Circuit held that narrowing the scope of a claim limitation in order to avoid a prior art rejection will not preclude a patentee from asserting equivalents relating to unsurrendered subject matter, even with respect to the same limitation. *LaBounty* does not support the recovery of subject matter that *was surrendered* to avoid the prior art. Here, the applicant surrendered the entire range above 0.040.

Prosecution history estoppel precludes Modine from recovering that same subject matter under the doctrine of equivalents. Modine is not entitled to any range of equivalents for hydraulic diameters above 0.040 inch.

If the doctrine of equivalents could be used: If the doctrine of equivalents could be used to expand the range of the hydraulic diameter, the range of equivalents should be narrow because the '580 patent is not a pioneer patent but at best an improvement in a crowded field. *Perkin-Elmer*, 822 F.2d at 1532, 3 U.S.P.Q.2d at 1324; *Pennwalt*, 833 F.2d at 937, 4 U.S.P.Q.2d at 1741.

If the doctrine of equivalents could be used, it would not apply unless each element in the claim or its substantial equivalent is found in the accused device. *Pennwalt*, 833 F.2d at 935, 4 U.S.P.Q.2d at 1739; *London*, 946 F.2d at 1538, 20 U.S.P.Q.2d at 1458. An element is not a "substantial equivalent" of another unless it performs substantially the same function in substantially the same way to achieve substantially the same result, and unless one of ordinary skill in the art would recognize the elements as equivalents. *American Hosp. Supply Corp. v. Travenol*

Laboratories, Inc., 745 F.2d 1, 10, 223 U.S.P.Q. 577, 584 (Fed. Cir. 1984).

Two elements of claims 9 and 10, the "web means joined to the flat side walls" and the "relatively small hydraulic diameter" are not found in the accused Showa condensers. The substantial equivalent of the flat side walls element and the relatively small hydraulic diameter element are not found in the Showa condensers.

The flat side walls element: Most Showa condensers have sawteeth in the wall of the tube. These condensers do not have the element "web means joined to the flat side walls of the tube" or the substantial equivalent of that element. They do not work in the same way as the condenser of claims 9 and 10. Although Mr. Saperstein testified that the "flat side walls" element of claim 9 literally reads on Showa's SC condenser, it has been found herein that there is no flat side wall element in the SC condenser that has sawteeth in the interior walls. Modine offered no testimony that the sawtoothed walls performed substantially the same function in substantially the same way to achieve substantially the same result as the flat side walls of the condenser of claim 9. The sawtoothed flow paths are not the substantial equivalent of the "flat side walls" element of claim 9. The sawtoothed walls do not function in substantially the same way as the flat walls of the condenser of claim 9. In Showa's sawtoothed condenser there is no flat area that is thinned as the condensate is pulled to the two corners. Condensate may be pulled into the troughs of each sawtooth, *see* Marto Tr. 797, but Professor Marto testified that the surface tension forces may be different in Showa's flow paths. Tr. 794-797. In testifying about the equivalence between the condenser of

claims 9 and 10 and the SC condenser, Professor Marto suggested that equivalence might be found because the "same mechanisms" of vapor shear force and surface tension are in play. Tr. 744-754. On cross-examination, however, he agreed that "shear force is a mechanism in every condenser in some magnitude." Tr. 821-22.

The experts were not sure how the condenser of the '580 patent and the accused Showa condensers functioned, but they understood the effects of surface tension and vapor shear force, and were in agreement that these factors contributed to making both condensers work. Although vapor shear force and surface tension mechanisms are at work in both the accused condenser and the condenser of claims 9 and 10, this is not enough to find that the condensers operate in the same way. These mechanisms are present in all condensers.

The relatively small hydraulic diameter element: The substantial equivalent of the "relatively small hydraulic diameter" element would be found in the accused Showa condensers if the condenser designs were identical, although all of Showa's accused condensers have a hydraulic diameter larger than 0.040 inch. The range claimed by Modine was a matter of design choice. One cannot say that a hydraulic diameter functions in a particular way unless the design of the particular condenser is known. In the same condenser design, Showa's hydraulic diameters would perform substantially the same function in substantially the same way to achieve substantially the same result as the hydraulic diameter in the range claimed by Modine. One of ordinary skill in the art would recognize the elements as equivalents.

The hydraulic diameter in Showa's condenser does not perform substantially the same function in substantially the same way to achieve substantially the same result as the hydraulic diameter of the PF condenser that practices claims 9 and 10.

When Modine was arguing that the accused SC condensers infringed claims 9 and 10, Modine wanted the range of the hydraulic diameter in claims 9 and 10 to be construed as including an upper limit of 0.070, rather than the upper limit of 0.040 referred to in the patent specification, prosecution history and some of the claims. In support of this position, Modine argued that the SC condensers perform in the same way as the condensers of claims 9 and 10 with respect to their "independence of gravity." The patent specification indicated that independence from gravity was an unexpected result of the invention. Showa Ex. 2, Col. 6, line 35.

Modine had made tests showing that its PF condenser, with a hydraulic diameter of 0.029, operated about as well in the horizontal or vertical position, with inlets at the top or bottom. Saperstein Tr. 426-26; Guntly dep., Showa Phys. Ex. A at 923-34; Costello dep., Showa Phys. Ex. F at 42.

Showa's SC condenser does not perform in the same way as the PF condenser. The SC condenser performs better in a vertical position with the inlet valve at the top, and the vapor flow moving down, than it performs in a horizontal position. It completely fails to operate in a vertical position with the vapor inlet placed at the bottom. Showa Ex. 10; Yamamoto Tr. 1172-1173.

Showa's condensers have flow paths with larger overall hydraulic diameters than the condenser of claims 9 and 10,

they have extruded tubes, and most of these condensers have sawteeth, air fins, and baffling. Although Showa condensers obtain substantially the same results as the PF condenser in terms of achieving high heat transfer, Modine has not met its burden of proving that its PF condensers and Showa's SC condensers achieve these results in substantially the same way.

The Showa SC condensers are not covered by claims 9 and 10 under the doctrine of equivalents.

* * *

CONCLUSIONS

1. It is found that the Commission has jurisdiction over the subject matter and the parties in this proceeding.

2. It is found that claims 9 and 10 of the '580 patent are invalid as anticipated under Section 102(b) of the Patent Act.

3. It is found that claims 9 and 10 of the '580 patent are invalid as obvious under Section 103 of the Patent Act.

4. It is found that claims 9 and 10 of the '580 patent, as construed herein, are not invalid as indefinite under Section 112 of the Patent Act.

5. It is found that if the '580 patent were valid, it would not be enforceable.

6. It is found that if the '580 patent were valid, it would not be infringed.

7. It is found that there is a domestic industry that practices claims 9 and 10 of the '580 patent.

8. It is found that the respondents have not engaged in an unfair act under Section 337 of the Tariff Act as amended.

The evidentiary record in this proceeding consists of all exhibits identified in Staff Ex. 1, Modine Documentary Exs. 1 and 2, and Showa Ex. 1. The evidentiary record also includes the transcript of the testimony at the hearing. The evidentiary record is hereby certified to the Commission.[1]

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1. Pursuant to s 210.53(h) of the Commission's Rules, this initial determination shall become the determination of the Commission unless a party files a petition for review of the initial determination pursuant to § 210.54, or the Commission pursuant to § 210.55 orders on its own motion a review of the initial determination or certain issues therein. For computation of time in which to file a petition for review, refer to §§ 210.54, 201.14, and 201.16(d).

The pleadings record includes all papers and requests properly filed with the Secretary in this proceeding.

/s/
Janet D. Saxon
Administrative Law Judge

Issued: April 23, 1993